



myDNA™

# COMPREHENSIVE WELLNESS REPORT

CAsdm1411 UHtest

Date of Birth  
15 May 1990

myDNA ID:  
24505

Pathology No:  
21628K1Z1R2

Reported:  
14 November 2018



#### Things to consider

We advise that you consult with your healthcare practitioner before you start any diet program recommended in this report. These recommendations may differ based on your age, height, weight or activity levels. Further, the diet recommendations in this report apply to over 18 years old. Please consult your healthcare practitioner about any diet and lifestyle changes if you are under 18 years of age. The information in this report is not intended to treat, diagnose or cure any medical condition or disease.



## What are genetics and nutrigenomics?

- Your DNA contains information that determines the characteristics that are with you at birth. These include hair and eye color, and other characteristics such as how you process nutrients. This genetic information affects you from the inside.
- Your environment, nutritional intake, and lifestyle also play an important role. These factors affect you from the outside.
- The interaction between nutrients and genes is referred to as nutrigenomics.
- Recent research has revealed the value of nutrigenomics testing for personal use. Individuals who are guided by their genetic profile are more likely to make sustainable, long-term and healthy changes to their lifestyle, including their diet and exercise behavior.

## What is the myDNA Comprehensive Wellness Report?

- The myDNA Comprehensive Wellness Report is designed for individuals looking to optimize their health and wellbeing.
- Our goal is to empower you to take more control in improving your quality of life. This report can assist you in understanding how your genes can influence:
  - Your body size and weight;
  - Your ability to lose weight;
  - Your appetite and eating behaviors;
  - How your body stores and processes dietary fats;
  - Your risk of having an abnormal cholesterol profile;
  - Your vitamin, mineral, and other nutrient needs;
  - Your sensitivity to specific tastes, foods and drinks; and
  - Your power, endurance, recovery and injury risk when you exercise.
- Understanding your genetics can help bring you one step closer to making more personalized health, wellbeing and lifestyle changes.
- You and your healthcare practitioner will be able to make better decisions about your health and you may be inspired to make lasting changes to your lifestyle.

## What are we testing?

As human beings, we all have the same set of genes, but small variations within each of these genes make us different from each other. These individual variations have also been shown to predict certain aspects of your health. Analysis of such genetic variations provides the basis for your report.

## How was your report created?

Your DNA was extracted from the cheek sample you provided and was analyzed at myDNA's NATA accredited laboratory in Melbourne, Australia.

Based on the available information found in the published literature, each gene has been assigned a category according to the likely clinical significance.

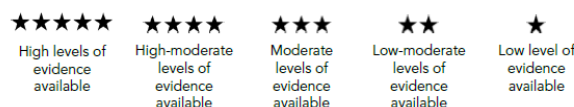
The three categories are:

- Least favorable
- Less favorable
- Normal/favorable

It is important to note that this categorization does not relate to the exact number of risk variants. For example, two risk variants may only have a moderate influence on risk and be allocated a less favorable finding (orange dot).

## What are our recommendations based on?

- Our recommendations are based on a rigorous review of all the current scientific literature that relates to your genetic type.
- We have developed an Evidence Rating System that explains the quality of the relevant scientific findings.
- We believe that this Evidence Rating System also provides scientific transparency as part of our commitment to you.



For a complete description of the types of studies and the evidence rating system used, **see Section D** at the end of the report.

## What are the limitations of this report?

- Each genetic marker tested is only one factor that predicts the likelihood of a particular outcome. However, your lifestyle, diet and the environment to which you are exposed have an impact on the final effect predicted by your genes. Such external factors cannot be taken into consideration in this report.
- Should you be concerned about specific parameters and levels of nutrients, you should speak with your healthcare practitioner regarding this, and discuss further testing.
- Please note we do not provide specific dietary recommendations for people with celiac disease, diabetes, allergies or other health conditions affecting diet and weight. Pregnant and/or breastfeeding women may have other dietary considerations. We encourage individuals to consult a healthcare practitioner for such advice.
- The information in this report doesn't serve to diagnose any diseases or genetic defects, as it doesn't predict the risk and likelihood of certain genetic outcomes. It is also not intended to treat, diagnose or cure any medical condition or disease.

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## WEIGHT MANAGEMENT

The balance between the number of calories you consume and the calories you burn is important for your weight management. This balance is controlled by a combination of your DNA and your environment. Your DNA controls your weight from within by influencing your appetite, your food choices, how quickly you burn calories and how fat is stored around your body. For each person, the relative influence that their DNA has on their body is different and unique.

Based on the scientific literature that investigates the interaction between DNA and nutrients, we have created your personalized profile to help focus your attention on the dietary and lifestyle factors that are most relevant for you. We hope to empower you to make better decisions in your everyday life that will influence your long-term weight and health.

### WHAT DO YOU NEED TO FOCUS ON TO BETTER MANAGE YOUR HEALTH?

Based on your DNA markers, the following dietary/ lifestyle factors are important for your health and weight management. This information is unique to you, so please consider these factors when making decisions about your health and wellbeing.

| MODERATE IMPACT  |               | Pay close attention: more effort required  |   |
|--|---------------|--|---|
| DIETARY/<br>LIFESTYLE<br>FACTORS                         | YOUR PROFILE  | PREDICTED OUTCOME  | RECOMMENDATIONS   |
| Protein Intake<br>Physical Activity                      | ● <i>FTO</i>  | <b>Weight, appetite and obesity</b><br>You are likely to have an increased appetite and an increased tendency to overeat. This can lead to weight gain and a moderately increased chance of obesity.   | <ul style="list-style-type: none"> <li>Limit total calories.</li> <li>Higher protein intake.</li> <li>Regular moderate exercise.</li> </ul>   |
| Energy balance<br>(calorie intake and physical activity) | ● <i>UCP1</i> | <b>Energy expenditure</b><br>Your gene variation indicates that you are likely to have decreased thermogenesis (the ability to burn calories to produce heat) and lower resting energy expenditure (the rate at which your body burns calories while resting). This can lead to weight loss difficulties when dieting. | <ul style="list-style-type: none"> <li>Reduce calorie intake.</li> <li>Regular physical activity.</li> </ul>  |
| Starch<br>(carbohydrates)                                | ● <i>AMY1</i> | <b>Starchy carbohydrates breakdown</b><br>Your gene variation indicates that your body produces a moderately high amount of amylase (the enzyme that breaks down starch) in your saliva. This gene variation is less likely to influence your risk of obesity.   | <ul style="list-style-type: none"> <li>Eat slowly.</li> <li>Chew each mouthful properly.</li> <li>Choose healthy sources of starch such as beans and legumes.</li> <li>Exercise.</li> </ul> |

| FAVORABLE IMPACT                 |                | No specific action: least effort required  |   |
|----------------------------------|----------------|--|---|
| DIETARY/<br>LIFESTYLE<br>FACTORS | YOUR PROFILE   | PREDICTED OUTCOME  | RECOMMENDATIONS   |
| Total Fat<br>Polyunsaturated Fat | ● <i>PPARG</i> | <b>Fat storage</b><br>Your gene variation suggests that, if you are not overweight, when you eat more food than your body needs, most of the excess calories are not converted straight into body fat. | <ul style="list-style-type: none"> <li>Limit total fat intake.</li> <li>Moderate aerobic activity.</li> </ul> |

## FAVORABLE IMPACT

No specific action: least effort required

| DIETARY/<br>LIFESTYLE<br>FACTORS      | YOUR PROFILE    | PREDICTED OUTCOME  | RECOMMENDATIONS  |
|---------------------------------------|-----------------|--|--|
| Total Fat<br>Saturated Fat            | ● <i>MTIF3</i>  | <b>Body size and weight regain</b><br>Your gene variation does not influence your chance of having an increased body size or your ability to maintain weight loss over time. | <ul style="list-style-type: none"> <li>No specific dietary recommendations for this genetic result.</li> </ul> |
| Total Calories<br>Aerobic<br>Exercise | ● <i>ADIPOQ</i> | <b>Fat burning</b><br>Your gene variation does not influence your levels of adiponectin (a hormone that initiates fat break down and boosts metabolism).                     | <ul style="list-style-type: none"> <li>No specific dietary recommendations for this genetic result.</li> </ul> |
| Snacking<br>Emotional<br>Eating       | ● <i>MC4R</i>   | <b>Snacking and eating habits</b><br>Your gene variation has not been associated with increased snacking, emotional eating, food cravings or a higher chance of obesity.     | <ul style="list-style-type: none"> <li>No specific dietary recommendations for this genetic result.</li> </ul> |



## TASTE SENSITIVITIES AND FOOD RESPONSE

When you take the first bite of a certain food, the taste buds in your mouth signal information about its chemical composition to your brain. This is how you perceive taste. The intensity of that taste is influenced by many factors, including your DNA. This defines your taste preferences which in turn determines, to some extent, what kind of foods you eat and how much you eat, which ultimately influences your overall health. In this part of the report, we unravel how your DNA affects your preference for specific tastes.

We also look at how your DNA affects the processing of some foods or drinks and any sensitivity-related response. For example, while some people can drink milk with no issues, for others it can create some less favorable symptoms. Same goes for caffeine or other foods and drinks. The type of the food response we described is often referred to as food intolerance and does not involve the immune system or cause allergic reactions. Your DNA can affect your tolerance to some foods and your body's response to them. Although your DNA cannot be changed, your lifestyle choices can. By understanding yourself more, you can be empowered to make positive lifestyle changes that work best for you.

It is important to note that we do not test for food allergies or intolerances which can cause immune reactions in the body.

### HOW DOES GENETICS AFFECT YOUR PREFERENCE AND RESPONSE TO CERTAIN NUTRIENTS?

Your DNA may affect your preference and processing of the following nutrients. Consider the implications that these results may have on your food preference and response, assess your dietary intake and where necessary, take action following the recommendations below.

| LIKELY IMPACT           |                  | Close attention is required   |   |
|-------------------------|------------------|---|---|
| SENSITIVITIES           | YOUR PROFILE     | PREDICTED IMPACT  | RECOMMENDATIONS   |
| Bitter foods and drinks | ● <i>TAS2R38</i> | <b>Preference to bitter taste</b><br>You are likely to have a greater sensitivity to bitterness. As such, you may have a decreased preference for bitter vegetables that are rich in antioxidants. Your gene variation is also associated with a greater preference for foods that are high in fat and salt.                                  | <ul style="list-style-type: none"> <li>Assess your dietary intake.</li> <li>Make sure you consume a variety of vegetables.</li> <li>Decrease intake of fatty and salty foods.</li> </ul>  |
| Sugar                   | ● <i>TAS1R2</i>  | <b>Preference to sweet foods</b><br>You are likely to have a reduced perception of sweetness. As such, you are likely to consume larger quantities of sweet foods.  | <ul style="list-style-type: none"> <li>Assess your dietary intake.</li> <li>Control your sugar intake.</li> <li>Choose natural source of sugar such as whole fruit over added sugar.</li> <li>Include protein in every meal.</li> </ul> |
| Dairy (lactose)         | ● <i>MCM6</i>    | <b>Lactase persistence (dairy processing)</b><br>You are likely to have a decreased ability to break down and digest the lactose found in dairy products. This increases your sensitivity to milk and some dairy products. On average, it takes one glass of milk to produce symptoms, but the level of tolerance may vary among individuals. | <ul style="list-style-type: none"> <li>Limit dairy intake if necessary.</li> <li>Consider milk alternatives (lactose free, soy, cashew, almond, rice or oat milk).</li> <li>Consider a lactase enzyme supplement.</li> </ul>            |



## POSSIBLE IMPACT

## Watch these in your diet

| SENSITIVITIES | YOUR PROFILE               | PREDICTED IMPACT  | RECOMMENDATIONS  |
|---------------|----------------------------|---|--|
| Caffeine      | ● CYP1A1-<br>CYP1A2<br>AHR | <b>Caffeine metabolism and consumption</b><br>You have a normal ability to process caffeine. Your genetic result is associated with average to slightly more caffeine consumption.                    | <ul style="list-style-type: none"> <li>• Consume caffeine earlier in the day.</li> <li>• Aim to stop drinking caffeine a few hours before bedtime.</li> </ul>  |
| Caffeine      | ● ADORA2A                  | <b>Caffeine, anxiousness and sleep disturbance</b><br>You may be moderately prone to side effects from caffeine. These include some anxiousness and sleep disturbance with larger amount of caffeine. | <ul style="list-style-type: none"> <li>• Adjust your caffeine intake if necessary to reduce your chances of anxiousness and sleep disturbance.</li> </ul>  |
| Caffeine      | ● CYP1A2                   | <b>Caffeine booster</b><br>Inducers are unlikely to boost your ability to process caffeine. Inducers include cruciferous vegetables, tobacco smoke (not recommended) and certain medications.         | <ul style="list-style-type: none"> <li>• Reduce caffeine intake as the day progresses.</li> <li>• Adjust caffeine intake before bedtime.</li> <li>• Consider decaffeinated beverages as an alternative.</li> </ul> |

## FAVORABLE IMPACT

## No specific action required

| SENSITIVITIES | YOUR PROFILE | PREDICTED IMPACT  | RECOMMENDATIONS  |
|---------------|--------------|---|--|
| Fats and oils | ● CD36       | <b>Preference for fats and oils</b><br>Your gene variation is associated with an improved ability to taste oils and fats in foods. This reduces your preference for foods with added fats and oils. | <ul style="list-style-type: none"> <li>• No specific dietary recommendation based on the result of this gene.</li> </ul> |



## HEART HEALTH

Cholesterol and triglyceride levels and blood pressure are two parameters that determine your heart health. These can be influenced by many factors such as your diet, your lifestyle and your DNA. Cholesterol is an essential type of fat that is carried in the blood and helps your body to build new cells, protect nerves, and produce hormones. Your liver can produce most of the cholesterol needed for these processes, but you can also get cholesterol directly from the foods you consume.

Too much blood cholesterol can compromise your heart health. Cholesterol in the blood has two main components: high-density cholesterol (HDL-C) and low-density cholesterol (LDL-C). A higher level of HDL-C or "good cholesterol" is favorable as HDL can help to keep excess cholesterol from building up in your blood vessels. Instead, LDL-C is not as desirable as it is linked to cardiovascular health problems. Maintaining a healthy diet low in saturated and trans-fat and maintaining an active lifestyle can help manage your cholesterol levels.

Triglycerides are another form of fats in the blood that can influence your heart health. Factors that can raise triglyceride levels include being overweight, consuming excess calories from refined and sugary foods, drinking too much alcohol, and having type 2 diabetes and/or kidney disease.

Your blood pressure naturally fluctuates all the time, depending on your activities. High blood pressure is defined as such when your blood pressure is persistently higher than normal. This can lead to cardiovascular issues. Physical activity, weight and alcohol consumption are some factors that can influence your blood pressure.

This part of the report identifies some of the genetic factors that can affect your cholesterol balance, your triglyceride levels, and your blood pressure and offers suggestions on what you can do about it. Remember, your DNA is only one piece of the puzzle and does not entirely determine your destiny. You can always improve your lifestyle to achieve better health.

Keep in mind that the only way to find out your cholesterol and triglyceride blood levels is via a blood test. Blood pressure can be measured and monitored using a blood pressure monitor.

### ARE CERTAIN NUTRIENTS LIKELY TO IMPACT YOUR HEART HEALTH?

Based on your genetics, these are the nutrients you need to focus on to keep your heart healthy. If you have any concerns about your cholesterol levels, triglyceride levels or your blood pressure, consult your healthcare practitioner for further advice. The recommendations below may be considered to help normalize your cholesterol profile.

| HIGHEST IMPACT                    |               | Focus on these   |   |
|-----------------------------------|---------------|--|---|
| NUTRITIONAL FACTORS               | YOUR PROFILE  | PREDICTED IMPACT   | RECOMMENDATIONS   |
| Total Fat<br>Monounsaturated fats | ● <i>LIPC</i> | <b>Cholesterol and triglycerides</b><br>Your gene variation is associated with a reduced ability to process dietary fats. This increases your chance of having an abnormal lipid profile (cholesterol and triglyceride levels).      | <ul style="list-style-type: none"> <li>• Monitor your lipid profile.</li> <li>• If cholesterol/ triglyceride levels are elevated:               <ul style="list-style-type: none"> <li>○ Limit total calories.</li> <li>○ Limit total fat intake.</li> <li>○ Favor polyunsaturated fats.</li> <li>○ Limit monounsaturated fats.</li> <li>○ Limit saturated fats.</li> <li>○ Regular vigorous exercise.</li> </ul> </li> </ul> |
| Salt (Sodium)                     | ● <i>GRK4</i> | <b>Salt influence on blood pressure</b><br>Your gene variation indicates that you are likely to have a reduced ability to clear dietary sodium, especially when your sodium intake is high. You may be more sensitive to the effects | <ul style="list-style-type: none"> <li>• Assess your daily intake of sodium.</li> <li>• Monitor your blood pressure.</li> <li>• Limit your sodium intake.</li> <li>• To cut down on sodium:               <ul style="list-style-type: none"> <li>○ Eat plenty of natural, unprocessed foods.</li> </ul> </li> </ul>   |

## HIGHEST IMPACT

## Focus on these

| NUTRITIONAL FACTORS | YOUR PROFILE | PREDICTED IMPACT  | RECOMMENDATIONS  |
|---------------------|--------------|---|--|
|                     |              | of too much sodium in your diet, which may also affect your blood pressure. | <ul style="list-style-type: none"> <li>○ Be mindful when adding sauces or condiments.</li> <li>○ Limit intake of packaged foods.</li> <li>○ Check food labels for sodium content.</li> </ul> |

## FAVORABLE IMPACT

## No specific action required

| NUTRITIONAL FACTORS | YOUR PROFILE | PREDICTED IMPACT  | EVIDENCE RATING   |
|---------------------|--------------|---|---|
| Wholegrain (Fiber)  | ● APOA5      | <b>Triglycerides</b><br>Your gene variation does not influence your chance of having high triglyceride levels.  | <ul style="list-style-type: none"> <li>• No specific dietary recommendations for this genetic finding.</li> <li>• Maintain a balanced diet with adequate intake of wholegrain fiber.</li> <li>• Seek advice from a healthcare practitioner about further testing if concerned about triglyceride levels.</li> </ul> |
| Omega-3             | ● NOS3       | <b>Antioxidant enzyme and blood pressure</b><br>Your gene variation predicts normal NOS3 function (an antioxidant enzyme). Your result does not influence your risk of high blood pressure or cardiovascular incidence. | <ul style="list-style-type: none"> <li>• No specific dietary recommendations for this genetic finding.</li> <li>• Seek advice from a healthcare practitioner for further testing if concerned about blood pressure and/or cholesterol levels.</li> </ul>  |





## VITAMINS AND MINERALS

The body requires vitamins, minerals and other nutrients to carry out its normal function and most of these are obtained from your diet. Your DNA affects how your body processes and utilizes these nutrients. Certain DNA variations can influence the levels of specific nutrients. This in turn may affect your likely requirements for those nutrients.

This part of the report will help to focus your attention on which vitamins and minerals you may need most and what to do about it.

Your genetic result is only one piece of the puzzle. Other factors such as your dietary intake and lifestyle will also affect your actual levels of these nutrients.

### ARE YOU LIKELY TO NEED MORE OF CERTAIN VITAMINS OR MINERALS?

The list of vitamins and minerals below are those whose levels may be affected by your DNA. This will serve you as a guide to identify the nutrients that require your attention. For each nutrient, we recommend focusing on those “hero foods” that you should consider eating to meet your dietary intake requirements.

An assessment of likely nutrient levels can be done by evaluating your dietary intake and any symptoms that may indicate lack of specific nutrients. In some cases, a blood test may be needed to determine your actual vitamin / mineral levels and, depending on this, specific supplements may be recommended by your healthcare practitioner.

| LIKELY NEED          |                        | Pay close attention: further action required   |   |
|----------------------|------------------------|--|---|
| VITAMINS OR MINERALS | YOUR PROFILE           | PREDICTED IMPACT   | RECOMMENDATIONS   |
| Vitamin B9 (Folate)  | ● <i>MTHFR</i>         | <b>Vitamin B9 needs</b><br>Your gene variation is associated with an increased risk of low folate (vitamin B9) levels, possible suboptimal vitamin B2 levels and higher homocysteine levels. | <ul style="list-style-type: none"> <li>Monitor your vitamin B9, vitamin B2, and homocysteine levels.</li> <li>Eat vitamin B9 rich foods regularly, e.g. dark leafy greens, broccoli, asparagus, and legumes.</li> <li>Eat vitamin B2 rich foods regularly, e.g. milk, yoghurt, beef, liver, mushrooms, and almonds.</li> <li>Consider L(S)-5-MTHF or folic acid supplementation.</li> </ul> |
| Vitamin B6           | ● <i>NBPF3</i>         | <b>Vitamin B6 needs</b><br>Your gene variation is associated with an increased risk of low vitamin B6 levels.  | <ul style="list-style-type: none"> <li>Monitor your vitamin B6 levels.</li> <li>Eat vitamin B6 rich foods regularly, e.g. chickpeas, tuna, liver, salmon, chicken breast, and fortified cereals.</li> <li>Consider vitamin B6 supplementation.</li> </ul>   |
| Iron                 | ● <i>TMPRSS6</i><br>TF | <b>Iron needs</b><br>Your gene variation is associated with low iron levels. Depending on your diet, this may increase your risk of iron deficiency and iron deficiency anemia.              | <ul style="list-style-type: none"> <li>Monitor your iron levels.</li> <li>Eat iron rich foods regularly, e.g. red meat, fish, shellfish, poultry, green leafy vegetables, legumes, oysters, dried fruits and iron fortified cereals.</li> <li>Consider iron supplementation.</li> </ul>   |

## POSSIBLE NEED

Monitor these: further action may be required

| VITAMINS OR MINERALS | YOUR PROFILE                                 | PREDICTED IMPACT  | RECOMMENDATIONS   |
|----------------------|--|---|---|
| Vitamin B12          | ● <i>FUT2</i>                                | <b>Vitamin B12 needs</b><br>Your gene variation is associated with a moderate risk of low vitamin B12 levels.   | <ul style="list-style-type: none"> <li>Monitor your vitamin B12 levels.</li> <li>Eat vitamin B12 rich foods regularly, e.g. fish, meat, poultry, eggs, milk, milk products, and fortified cereals.</li> <li>Consider vitamin B12 supplementation.</li> </ul>  |
| Vitamin A            | ● <i>BCMO1</i>                               | <b>Vitamin A needs</b><br>Your gene variation is associated with a moderate risk of low vitamin A levels.   | <ul style="list-style-type: none"> <li>Monitor your vitamin A levels.</li> <li>Eat vitamin A rich foods, from animal products regularly, e.g. dairy, oily fish, and liver.</li> <li>Consider preformed vitamin A supplementation.</li> </ul>  |
| Vitamin C            | ● <i>SLC23A1</i>                             | <b>Vitamin C needs</b><br>Your gene variation is associated with a moderate risk of low vitamin C levels.   | <ul style="list-style-type: none"> <li>Monitor your vitamin C levels.</li> <li>Eat vitamin C rich foods regularly, e.g. citrus fruits, red and green peppers, kiwi fruit, broccoli, and strawberries.</li> <li>Consider vitamin C supplementation.</li> </ul>   |
| Vitamin D            | ● <i>GC</i><br><i>CYP2R1</i><br><i>DHCR7</i> | <b>Vitamin D needs</b><br>Your gene variation is associated with a moderate risk for vitamin D insufficiency.   | <ul style="list-style-type: none"> <li>Monitor your vitamin D levels.</li> <li>Spend adequate time outdoors in the sun.</li> <li>Eat vitamin D rich foods regularly, e.g. fatty fish, egg yolk, liver, and vitamin D fortified foods and beverages.</li> </ul>  |
| Calcium<br>Vitamin D | ● <i>GC</i><br><i>VDR</i>                    | <b>Calcium, bone strength and stress fracture</b><br>Your gene variation is associated with decreased bone strength and a moderate risk of stress fracture with low calcium intake. | <ul style="list-style-type: none"> <li>Monitor your calcium and vitamin D levels.</li> <li>Eat calcium rich foods regularly, e.g. milk, yoghurt, cheese, canned fish with bones, green leafy vegetables, legumes, and fortified dairy-free milks.</li> <li>Consider calcium supplementation.</li> </ul> |

## TYPICAL NEED

No specific action required

| VITAMINS OR MINERALS | YOUR PROFILE   | PREDICTED IMPACT  | RECOMMENDATIONS   |
|----------------------|----------------|---|---|
| Omega-3              | ● <i>FADS1</i> | <b>Omega-3 and omega-6 processing</b><br>Your gene variation predicts a typical ability to process omega-3 and omega-6 fatty acids and a typical lipid profile. | <ul style="list-style-type: none"> <li>Maintain a balanced diet with omega-3 rich foods.</li> <li>Hero foods: fatty fish, nuts and seeds (walnuts, flaxseeds, and chia seeds).</li> </ul> |



## FITNESS AND EXERCISE

Your physical and athletic performance depends on several factors. For example, how efficiently your muscles contract and use energy, or how long and elastic your tendons are. Over the last two decades, scientific research has provided increasing evidence that these factors are controlled by your DNA in addition to your lifestyle. The combination of your DNA and the experiences that you have throughout your life makes you unique.

In this section of the report we explain what some of the most important genes reveal about your unique fitness and exercise potential. This information can empower you to choose the type of training that is likely to give you the best results, which will help you to achieve your exercise and fitness goals.

### YOUR PROFILE



YOUR OVERALL FITNESS PROFILE IS **ENDURANCE**

#### POWER VS ENDURANCE

**40% POWER / 60% ENDURANCE**

Your muscles are best suited to slow and steady exercise



#### STAMINA



Your aerobic fitness is not naturally high, but you can increase it with targeted training.



#### INJURY



You have a normal risk of soft tissue injury and should exercise with care.



#### RECOVERY



Muscle soreness after intense exercise is not expected to be a major issue for you and you should be able to exercise on most days.

#### LEGEND

|                    |  |
|--------------------|--|
| Power vs endurance | The profile assigned for power vs endurance is based on the combination of gene results from ACTN3, AGT, AMPD1, PPARGC1A and IL6 genes. Based on a weighted average of these five results, we provide a score which indicates your Power or Endurance potential. |
| Stamina            | The profile assigned for stamina is based on the combination of results from AGT, PPARGC1A and IL6.  |
| Injury             | The profile assigned for injury is based on the combination of results from COL5A1 and COL1A1  |
| Recovery           | The profile assigned in this section is based on the combination of results from IL6, ACTN3 and AMPD1.   |



## GENETIC WEAKNESSES

These can be easily managed with training

| FITNESS TRAIT                     | YOUR PROFILE | PREDICTED IMPACT  | RECOMMENDATIONS  |
|-----------------------------------|--------------|---|--|
| Power vs<br>Endurance<br>Recovery | ● ACTN3      | <b>Muscle power</b><br>Your fast-twitch muscle fibers are partially equipped for sudden bursts of activity. Your muscles can partially grow in size with high intensity training. This makes you moderately suited to sports requiring sudden bursts of activity, strength and power.<br><br>You may be more prone to muscle soreness and muscle injury with high intensity training. | <ul style="list-style-type: none"> <li>Combine high and low intensity training to improve your fitness and strength.</li> <li>For muscle soreness, consider additional rest days.</li> </ul>   |
| Power vs<br>Endurance<br>Stamina  | ● AGT        | <b>Muscle strength</b><br>Your gene variation predicts normal muscle contraction and muscle strength. You are expected to have normal muscle power.   | <ul style="list-style-type: none"> <li>Follow general training recommendations.</li> <li>Train more frequently.</li> </ul>   |
| Injury Risk                       | ● COL1A1     | <b>Risk of soft tissue injury</b><br>Your gene variation is associated with normal joint support. A normal risk of soft tissue injury (e.g. tendon and ligament injuries) is expected.  | <ul style="list-style-type: none"> <li>Ensure adequate warm up.</li> <li>Strengthen your supporting muscles.</li> <li>Stretch regularly.</li> <li>Improve technique and body awareness.</li> </ul>   |
| Injury Risk                       | ● COL5A1     | <b>Injury risk and flexibility</b><br>Your gene variation is associated with improved joint flexibility. You have a normal risk of tendon injury.   | <ul style="list-style-type: none"> <li>There are no specific recommendations for this genetic result.</li> <li>General recommendations to prevent injuries:               <ul style="list-style-type: none"> <li>Ensure adequate warm up and cool down.</li> <li>Stretch after exercising.</li> <li>Do strengthening exercises.</li> </ul> </li> </ul> |

## GENETIC STRENGTHS

Make the most of it for optimum results

| FITNESS TRAIT                     | YOUR PROFILE | PREDICTED IMPACT  | RECOMMENDATIONS   |
|-----------------------------------|--------------|---|---|
| Power vs<br>Endurance<br>Recovery | ● AMPD1      | <b>Muscle energy</b><br>Your muscles can produce maximum energy in short bursts. This allows you to push yourself without becoming too fatigued. With this gene variation, you are also less prone to muscle soreness after intense exercise. | <ul style="list-style-type: none"> <li>Combine high and low intensity training to improve your fitness and strength.</li> </ul> |
| Power vs<br>Endurance<br>Stamina  | ● PPARGC1A   | <b>Endurance</b><br>Your genetic finding indicates that your slow-twitch muscle fibers are capable of maximum growth in response to exercise. Your aerobic fitness is also naturally high. This makes you well suited for endurance training. | <ul style="list-style-type: none"> <li>Do endurance training.</li> <li>Use lighter weights with more sets and reps.</li> </ul>  |

## GENETIC STRENGTHS

Make the most of it for optimum results

| FITNESS TRAIT                                | YOUR PROFILE | PREDICTED IMPACT   | RECOMMENDATIONS   |
|--|--------------|--|---|
| Power vs<br>Endurance<br>Stamina<br>Recovery | ● IL6        | <b>Recovery time</b><br>Your gene variation is associated with optimal muscle fiber recovery and regeneration. You are less prone to muscle soreness after intense training and can recover more quickly. Your gene variation also gives you a natural advantage for power sports. | <ul style="list-style-type: none"> <li>There are no specific recommendations for this genetic result.</li> <li>As recovery is less likely to be an issue, you can train most days.</li> </ul> |



**WEIGHT  
MANAGEMENT**





## WEIGHT, APPETITE AND OBESITY

## GENE

FTO

## SNPs

rs1558902  
rs9939609

## YOUR RESULT

• AT

One risk variant allele and one normal allele\*

## MODERATE RISK OF OBESITY

## PREDICTED IMPACT

Increased appetite;  
Lack of feeling full;  
Preference for high calorie foods; and  
Moderately increased chance of obesity.

## DIETARY AND/OR LIFESTYLE FACTORS

Protein Intake  
Physical Activity

## RECOMMENDATIONS

- Limit total calories.
- Higher protein intake.
- Regular moderate exercise.

## ABOUT THE GENE

The *FTO* gene is linked to body size, body fat storage and obesity. This gene affects eating habits, food preferences, appetite and the feeling of being full in the brain's control center (the hypothalamus). The *FTO* gene is also linked to your chance of being overweight.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- 20-30% higher chance of obesity.
- Lack of feeling full due to decreased sensitivity to satiety cues.
- Increased appetite.
- Preference for high calorie foods (foods that are high in fat or energy-dense).
- Less control over the amount of food eaten, especially during childhood and adolescence.

This genetic finding is strongly associated with weight gain from childhood onwards and peaks at 20 years of age.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★★★

The following dietary and lifestyle interventions have been shown to result in weight loss for individuals with your genetic finding:

**Limit total calories**  
**Higher protein intake (25% of total calories)**

Consider a calorie restricted diet with a high protein content (25% of total daily calories from protein). The benefits associated with this diet include:

- The most weight loss for this genetic result.
- Improvement in body fat distribution.
- Long term weight loss as shown in one randomized controlled trial over 2 years.
- Greater satiety as a result of a high protein diet.

**Regular moderate exercise**

Regular moderate physical activity (at least 30 minutes per day, 5 days a week) has also been shown to reduce the risk of obesity associated with this genetic finding by 30%.

\* This genetic finding indicates that one or both of the *FTO* variations tested had the risk allele.

## FAT STORAGE

## GENE

PPARG

## SNPs

rs1801282

## YOUR RESULT

• CG

One normal allele and one reduced functioning allele

### MODERATELY REDUCED CONVERSION OF EXCESS ENERGY INTO FAT

## PREDICTED IMPACT

Less accumulation of body fat if more food than needed is eaten;  
Improved insulin sensitivity; and  
Reduced risk of diabetes.

## DIETARY AND/OR LIFESTYLE FACTORS

Total Fat  
Polyunsaturated Fat

## RECOMMENDATIONS

- Limit total fat intake.
- Moderate aerobic activity.

## ABOUT THE GENE

The human body requires a certain amount of nutrients to sustain energy levels. However, if more food is consumed than the body needs, the excess calories are stored as body fat. The *PPARG* gene is called the 'thrifty' gene as it facilitates this fat storage process and saves fat for future energy needs.

## GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- Reduced ability to convert excess calories into body fat for energy storage.
- Less accumulation of body fat if more food is eaten than is required.
- Lower body mass index (BMI) and protection against weight gain.
- Improved insulin sensitivity and overall reduced risk of obesity and type 2 diabetes.

This genetic finding is only favorable in individuals who do not suffer from diabetes. If the individual develops diabetes due to lifestyle or other factors, this protective mechanism is lost.

## RECOMMENDATIONS

EVIDENCE RATING ★★★★★

If being overweight is a concern, consider the following dietary and lifestyle interventions to aid with weight loss:

**Limit fat intake (<25% of total calories)**

Limit the amount of saturated fat intake (less than 10% of total calories) and total dietary fat (less than 25% of total calories) that you consume.

**Moderate aerobic activity**

Regular moderate physical activity (at least 30 minutes per day, 5 days a week).

## BODY SIZE AND WEIGHT REGAIN

## GENE

MTIF3

## SNPs

rs1885988

rs4771122

## YOUR RESULT

• AA

Two normal alleles\*

## NORMAL RISK OF HIGH BMI

## PREDICTED IMPACT

No association with higher BMI; and  
No impact on weight management.

## DIETARY AND/OR LIFESTYLE FACTORS

Total Fat  
Saturated Fat

## RECOMMENDATIONS

No specific dietary recommendations for  
this genetic result.

## ABOUT THE GENE

The *MTIF3* gene is involved in the production of energy inside mitochondria, the powerhouses of your cells. Your cells need energy-rich molecules derived from food to maintain function. Cells that need more energy, such as muscle cells, have more mitochondria to cater for their high energy requirements. The *MTIF3* gene has been linked to increased body size, as measured by Body Mass Index (BMI) and also to weight regain after dieting. However, the exact mechanism facilitating this process is yet to be discovered.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding is not associated with a higher body mass index (BMI).

Compared to individuals with a different variation of this gene, your genetic result provides no advantage in weight maintenance after weight loss. Average weight regain is expected over time.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★★★

No specific diet has been  
recommended based on  
this result.

Dietary recommendations will be determined by genetic findings for other genes.

- Dietary recommendations will be determined by findings of your other genes.
- Your genetic result is only one factor that regulates your weight and BMI. Other factors, like dietary and lifestyle choices (such as the amount of calories you consume), are equally as important and may influence your body weight.

\* This genetic finding indicates that both the *MTIF3* variations tested were not found to have a risk allele.

## FAT BURNING

## GENE

ADIPOQ

## SNPs

rs1501299

## YOUR RESULT

• TT

Two normal alleles

NORMAL LEVELS OF FAT BURNING  
HORMONE ADIPONECTIN

## PREDICTED IMPACT

Normal ability to burn body fat; and  
No association with obesity.

## DIETARY AND/OR LIFESTYLE FACTORS

Total Calories  
Aerobic Exercise

## RECOMMENDATIONS

No specific dietary recommendations for  
this genetic result.

## ABOUT THE GENE

The *ADIPOQ* gene contains the information needed to produce a hormone called adiponectin that is involved in boosting metabolism, breaking down fats and regulating glucose concentrations in the blood. Lower levels of adiponectin are associated with insulin resistance, an increased BMI and higher amounts of fat around the abdominal area. This may lead to obesity and other obesity-related conditions. Adiponectin levels increase with weight loss and decrease with weight gain.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★☆☆

Your genetic finding has not been associated with reduced adiponectin levels or an increased risk of obesity.

However, it is important to note that being obese or overweight naturally decreases your adiponectin levels.

Other factors that may influence adiponectin levels:

- Ethnicity: White Europeans normally have higher adiponectin levels compared to individuals of Chinese or South Asian origin.
- Gender: Adiponectin levels are lower in males than in females; this may be attributed to the inhibitory effect of testosterone on adiponectin production.

## RECOMMENDATIONS

## EVIDENCE RATING ★★☆☆

No specific dietary and  
lifestyle intervention for  
your genetic finding.

Dietary recommendations will be determined by genetic findings for other genes.

Healthy individuals within the normal weight range can maintain their adiponectin levels by avoiding excessive calorie intake.

## ENERGY EXPENDITURE

## GENE

UCP1

## SNPs

rs1800592

## YOUR RESULT

• AG

One variant allele and one normal allele

LOWER ABILITY TO BURN  
CALORIES TO PRODUCE HEAT

## PREDICTED IMPACT

Fewer calories needed to maintain body weight;  
More storage of fat in abdomen; and  
Difficulty losing weight when dieting.

## DIETARY AND/OR LIFESTYLE FACTORS

Energy balance (calorie intake and physical activity)

## RECOMMENDATIONS

- Reduce calorie intake.
- Regular physical activity.

## ABOUT THE GENE

The amount of calories consumed (energy in) and calories burnt (energy out) make up your overall energy balance. The amount of energy required to maintain essential processes in the body is called resting energy expenditure (REE). It accounts for up to 70% of the energy burnt each day. Therefore, REE is a very important factor in weight loss. The *UCP1* gene has been shown to affect the variability in REE and thermogenesis (the process of burning calories to produce heat) between different individuals. This can influence the ability to lose weight when dieting and therefore affects the risk of weight gain.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Decreased ability to burn calories to produce heat (thermogenesis).
- Lower energy requirements to sustain essential processes in the body (resting energy expenditure).
- Lower daily energy intake to maintain body weight.
- More fat stored under the skin (subcutaneous fat) in the abdomen area.
- Difficulty losing weight when dieting. This may contribute to an increased risk of obesity.

## RECOMMENDATIONS

Reduce your energy input  
(calorie intake)

Your genetic finding predicts that your body requires less energy (calories) to maintain proper function. Any extra calories you consume will contribute to weight gain.

## Regular physical activity

- Due to your genetic finding, your ability to burn calories during rest (resting energy expenditure or REE) is naturally low.
- You can boost your REE by doing regular moderate exercise.
- Your REE will remain elevated as long as you exercise at least three days a week on a regular basis.

## Create an energy deficit

If you are trying to lose weight, you need to create an energy deficit which means that the total calories consumed (energy in) must be lower than energy out (the sum of your resting energy expenditure and energy burnt during physical activity).



## SNACKING AND EATING HABITS

## GENE

MC4R

## SNPs

rs17782313

## YOUR RESULT

• TT

Two normal alleles

NORMAL SNACKING AND  
EMOTIONAL EATING TENDENCY

## PREDICTED IMPACT

Normal regulation of eating habits;  
No influence on food choices; and  
No association with obesity.

## DIETARY AND/OR LIFESTYLE FACTORS

Snacking  
Emotional Eating

## RECOMMENDATIONS

No specific dietary recommendations for  
this genetic result.

## ABOUT THE GENE

The *MC4R* gene is important for maintaining the energy balance in the brain's control center (the hypothalamus). It controls appetite, food preference, food enjoyment, the feeling of being full (satiety), and eating behaviors such as snacking and emotional eating. The *MC4R* gene is also linked to your chance of being overweight.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding has not been associated with an increased BMI or obesity. It is also not associated with an increased tendency for emotional eating. Your appetite regulation and tendency to snack are also within the norm.

Other factors, like dietary and lifestyle choices (e.g. the amount of calories you consume) are equally as important and may influence your body weight.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★

No specific diet has been  
recommended based on  
this result.

Dietary recommendations will be determined by genetic findings for other genes.

## STARCHY CARBOHYDRATES BREAKDOWN

### GENE

AMY1

### SNPs

CNV

### YOUR RESULT

• 7-8 CNV

Moderately high copy number of AMY1 gene

### MODERATELY INCREASED ABILITY TO BREAK DOWN STARCH

#### PREDICTED IMPACT

Possibly normal tolerance of starchy carbohydrates; and  
Less impact on the risk of obesity.

#### DIETARY AND/OR LIFESTYLE FACTORS

Starch (carbohydrates)

#### RECOMMENDATIONS

- Eat slowly.
- Chew each mouthful properly.
- Choose healthy sources of starch such as beans and legumes.
- Exercise.

### ABOUT THE GENE

The AMY1 gene encodes for an enzyme called amylase. Amylase is mainly made by the salivary glands and the pancreas. The primary function of amylase is to break down starch from your diet into simple sugar molecules that your body can use as an energy source. The number of copies you have of the AMY1 gene gives a good indication of how much salivary amylase your body can make which influences your ability to digest starchy carbohydrates.

### GENETIC INTERPRETATION

### EVIDENCE RATING ★★★★★

You have a moderately high copy number of the AMY1 gene. This genetic finding is associated with:

- Moderately increased ability to produce the salivary amylase.
- Moderately increased ability to break down starch.
- Possibly normal tolerance of starch in the diet.

Your genetic finding is less likely to influence the risk of obesity.

### RECOMMENDATIONS

To improve your amylase production:

|   |  |
|---|--|
| <b>Eat your food slowly</b>               | Eating slowly increases the production of hormones that promote satiety (the sense of being full). These hormones control the release of insulin which regulates your blood sugar. |
| <b>Chew each mouthful properly</b>        | Chewing allows you to maximize the amount of amylase you have, which helps to increase the amount of starch broken down.   |
| <b>Focus on healthy sources of starch</b> | Beans and legumes are sources of healthy starch. Non-starch foods like vegetables and fruit are also excellent sources of vitamins, minerals and fiber.                            |
| <b>Exercise</b>                           | Higher levels of the enzyme amylase have been observed in individuals who exercise regularly.  |
| <b>Other factors</b>                      | Factors that can lower salivary amylase activity: <ul style="list-style-type: none"> <li>• Smoking</li> <li>• Alcohol consumption</li> <li>• Emotional stress</li> </ul>           |



## TASTE PREFERENCE & FOOD RESPONSE



## PREFERENCE TO BITTER TASTE

## GENE

TAS2R38

## SNPs

rs713598

## YOUR RESULT

• CC

Two variant alleles

## GREATER SENSITIVITY TO BITTERNESS

## PREDICTED IMPACT

Perceive bitterness as an unpleasant taste;  
Decreased preference for bitter foods; and  
Increased preference for fatty and salty foods.

## FACTORS

Bitter foods and drinks

## RECOMMENDATIONS

- Assess your dietary intake.
- Make sure you consume a variety of vegetables.
- Decrease intake of fatty and salty foods.

## ABOUT THE GENE

The *TAS2R38* gene contains the information needed to produce receptor cells that are located on the tongue as well as in the stomach, colon, bladder and upper respiratory tract. These receptors play an important role in determining an individual's perception of bitter taste.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- A greater sensitivity to bitterness. You may perceive bitterness as an unpleasant taste.
- Decreased preference for bitter vegetables such as broccoli, kale, cauliflower, chicory and rhubarb. This could potentially result in inadequate intake of bitter vegetables which are rich in antioxidants.
- Decreased preference for bitterness in drinks like beer, coffee and green tea.
- Greater preference for foods high in fat and salt, such as cured meat and butter. Salt and fat can make foods more palatable and less bitter.

Individuals with this genetic variation also perceive some types of alcohol as bitter or unpleasant, resulting in possibility of reduced overall alcohol intake.

Please note that other factors may also affect your sensitivity to a lesser extent. Some of these factors include:

- The density of your papillae (bumps found on the surface of the tongue). This is indicative of the how many taste receptors are present.
- Continuous use of certain medications that can diminish your sensitivity to different flavors and tastes.

## RECOMMENDATIONS

## Assess your daily intake of vegetables, fatty foods and salty foods.

- Due to the effect that your gene variation may have on your food preferences, assess your dietary intake of vegetables, fatty foods and salty foods.

## Consume enough vegetables

- The average recommendation is five or more servings of vegetables per day.
- Vegetables that you may perceive as bitter are important sources of vitamins, antioxidants and minerals. It is also well documented that they provide protective properties against several types of diseases, including cancer. Additionally, they are rich in fiber and low in calories which makes them good food options to help you lose or maintain weight.

## Decrease intake of fatty and salty foods

If food items that are high in fat and salt content are a big part of your diet, gradually reduce your intake.

## PREFERENCE TO SWEET FOODS

## GENE

TAS1R2

## SNPs

rs35874116

## YOUR RESULT

• TT

Two variant alleles

## HIGHER PREFERENCE FOR SWEET FOODS

## PREDICTED IMPACT

Greater intake of sugary foods;  
Greater intake of fruit; and  
Increased risk of tooth decay and cavities.

## FACTORS

Sugar

## RECOMMENDATIONS

- Assess your dietary intake.
- Control your sugar intake.
- Choose natural source of sugar such as whole fruit over added sugar.
- Include protein in every meal.

## ABOUT THE GENE

The *TAS1R2* gene encodes for sweet taste receptor cells that are located on taste buds and in the gut. These receptors play an important role in detecting the sweetness of sugar. Genetic variations in the *TAS1R2* gene can predict your ability to perceive sweetness, which in turn can impact your sugar intake.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Decreased ability to perceive sweetness.
- Greater preference for sweet foods.
- About a 30% greater intake of added and natural sugar compared to individuals without genetic variants.
- Greater incidence of tooth decay and cavities, both in children and adults.

Individuals with your genetic variation tend to consume more sugar in order to feel satisfied or full.

## RECOMMENDATIONS

## Assess your daily intake

- It is advised that you evaluate your dietary intake of sugar. The WHO recommends that the daily intake of added sugar should be between 5-10% of your total daily energy allowance.
- The exact amount will depend on your body weight and your goal weight. Speak to your healthcare practitioner about this.

## Reduce your sugar intake

- If energy dense foods, especially sweet foods, are a big part of your diet, gradually reduce your intake of those foods. Try to restrict your intake to the lower end of your daily allowance.
- Reducing your consumption can help to modify your preference for sweet foods and over time may help to decrease your overall intake.

## Choose natural sources of sugar

- If you crave sweet foods, choose natural sources of sugar, such as whole fruit, instead of foods with added sugar.
- The recommended daily fruit allowance is up to two servings each day.

## Include protein in every meal

- One of the reasons you may crave more sugar is because sugar may not effectively turn on the signal that alerts your body that you are full.
- Protein can activate the same signal that sugar does to alert your body that you are full. Include protein in every meal to help reduce sugar cravings.

## PREFERENCE FOR FATS AND OILS

## GENE

CD36

## SNPs

rs1761667

## YOUR RESULT

• GG

Two normal alleles

INCREASED ABILITY TO TASTE  
FATS AND OILS

## PREDICTED IMPACT

Highly sensitive to the taste of oils and fats in foods; and  
Decreased preference for added fats and oils in foods.

## FACTORS

Fats and oils

## RECOMMENDATIONS

No specific dietary recommendation based on the result of this gene.

## ABOUT THE GENE

The *CD36* gene produces a receptor protein that binds and helps to facilitate fatty acid uptake and breakdown in the body. The gene is expressed in many organs, including our taste buds.

The DNA variation tested has been shown to reduce the amount of protein produced and influence our taste perception of fats and oils in foods. The exact underlying mechanism of how this happens is not fully understood. It is suggested that a reduced sensitivity to the taste of fat leads to an increased intake of fatty foods as a compensatory reaction. This is particularly important as our fat intake can affect our heart health.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your DNA variation is associated with:

- Increased ability to detect fats and oils in food.
- This result is associated with 3-6 times increased sensitivity to the taste of added oils and fats in foods.
- Decreased preference for added fats and oils in foods (both saturated and unsaturated fats).

People with this genetic variation are up to 6 times more sensitive to the taste of fat in their diet.

This gene variation has not been shown to influence cholesterol levels.

## RECOMMENDATIONS

## No specific dietary advice

- Fats can make food more palatable and fat is high in calories. It is therefore important to be mindful of the amount of fat in your diet.
- Saturated fats (such as those found in butter, processed foods and coconut and palm oils) can increase your risk of cholesterol imbalance and heart disease. It is therefore advisable to limit your dietary intake of saturated fats.
- While foods with unsaturated fat are an important part of our diet, it is important to keep in mind that the overall intake of any type of fat should not exceed 30% of your total dietary intake in accordance with WHO recommendations. Healthy unsaturated fats can be found in seeds, nuts, legumes, avocados, beans and olives.



## LACTASE PERSISTENCE (DAIRY PROCESSING)

## GENE

MCM6

## SNPs

rs4988235

## YOUR RESULT

• CC

Two risk variant alleles

INCREASED SENSITIVITY TO MILK  
AND SOME DAIRY PRODUCTS

## PREDICTED IMPACT

Reduced ability to digest milk and some dairy products; and  
Dairy may cause some gastrointestinal discomfort.

## FACTORS

Dairy (lactose)

## RECOMMENDATIONS

- Limit dairy intake if necessary.
- Consider milk alternatives (lactose free, soy, cashew, almond, rice or oat milk).
- Consider a lactase enzyme supplement.

## ABOUT THE GENE

The *MCM6* gene helps to regulate the production of the enzyme lactase. Lactase helps to digest lactose, a sugar found in milk and other dairy products. In most human populations, the lactase enzyme is produced in newborns, but lactase levels start to decrease during mid childhood (from the age of 5 onwards). This is called lactase non-persistence. In individuals with lactase non-persistence, higher consumption of milk and some dairy products may result in gastrointestinal discomfort. However, some individuals retain high lactase levels throughout their adult life and can produce an adequate amount of lactase in the body to digest milk and other dairy products. This ability to produce lactase in adult life is referred to as lactase persistence.

Unlike lactase deficiency, where no lactase is being produced, individuals with lactase non-persistence are still able to produce some of the lactase enzyme. This means that they can tolerate some dairy in their diet. Also, due to differences in genetic backgrounds, this test alone is not able to predict lactose sensitivity in individuals of African descent.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Reduced production of the lactase enzyme.
- Reduced ability to digest milk and some dairy products (lactase non-persistence).
- Increased sensitivity to milk and some dairy products.
- Positive hydrogen breath test result in most cases.

## RECOMMENDATIONS

Due to the common nature of this finding, no action is required unless there are symptoms occur.

## Limit dairy intake

If gastrointestinal symptoms are experienced, consider limiting dairy intake to a tolerated amount. You may be able to consume a small amount of milk and some dairy products without issue. On average, it takes one glass of milk to produce symptoms, but the level of tolerance may vary among individuals.

## Consider lactose free milk alternatives

If you wish to consume more milk than is usually tolerated, consider milk alternatives, such as lactose-free milk, soy milk, almond milk, rice milk or oat milk. Some milk products, such as hard and mature cheeses, contain almost no lactose while others, such as cream, butter, cottage cheese and ricotta contain very little lactose.

## Lactase enzyme supplement

Taking a lactase enzyme supplement before dairy consumption may help prevent gastrointestinal symptoms.

## Notes:

- Please note that this result does not exclude lactase deficiency from other causes such as acquired lactase deficiency or congenital lactase deficiency.
- Lactase non-persistence can be confirmed with a hydrogen breath test however this is not required for this genetic finding.

- Lactase persistence is a relatively recent human evolutionary event which varies geographically. It coincides with the development of dairy farming. It became an advantage in times of famine to live off dairy products, so lactase persistence is more frequent in areas where dairy farming is or has been common.

## CAFFEINE

| GENE          | SNPs      | YOUR RESULT  |
|---------------|-----------|--|
| CYP1A1-CYP1A2 | rs2470893 | <ul style="list-style-type: none"> <li>● GG</li> </ul> Two normal alleles                                |
| AHR           | rs4410790 | <ul style="list-style-type: none"> <li>● CT</li> </ul> One normal allele and one high functioning allele |
| ADORA2A       | rs3761422 | <ul style="list-style-type: none"> <li>● CT</li> </ul> One normal allele and one variant allele          |
| CYP1A2        | rs762551  | <ul style="list-style-type: none"> <li>● AC</li> </ul> One inducible allele and one non-inducible allele |

### NORMAL CAFFEINE PROCESSING & SOME IMPACT ON SLEEP AND ANXIOUSNESS

#### PREDICTED IMPACT

Caffeine effect can last between 6-8 hours; Larger amount of caffeine may impact your sleep and make you feel jittery; Eating certain foods or smoking cannot speed up caffeine processing.

#### FACTORS

Caffeine

#### RECOMMENDATIONS

- Based on your combination of genetic results, it would be ideal to leave 8 hours between your last caffeine intake and your intended bedtime.
- Consider decaffeinated beverages.

#### ABOUT THE GENE

Caffeine is a stimulant naturally produced by many plants. It is mainly found in roasted coffee beans, cocoa bean, tea leaves, yerba mate and guarana berries. The *CYP1A1* and *CYP1A2* genes both produce liver enzymes that help to break down caffeine. The caffeine test looks at a region between these two genes that can be used to predict the rate of caffeine processing. The *AHR* gene enhances the activity of *CYP1A1* and *CYP1A2* gene. *AHR* is also involved in regulating inflammation and cellular processes related to immune function.

The caffeine test also looks at a genetic variation within the *CYP1A2* gene itself.

This genetic variation looks at whether your *CYP1A2* enzyme can work faster (i.e. be "boosted") in the presence of certain substances, called inducers. This means that if you have a genetic variation, your body can process caffeine more effectively than usual in the presence of these substances. Inducers include cruciferous vegetables (e.g. cauliflower, cabbage, broccoli and brussels sprouts), chargrilled meat, certain drugs and tobacco smoke (not recommended).

The *ADORA2A* gene controls how caffeine is received in the brain. A chemical called adenosine helps a person to feel sleepy. Caffeine can reduce the ability of adenosine to act and can therefore interfere with sleep. Caffeine affects individuals differently and studies have shown that variations in sleep quality, anxiousness and alertness caused by caffeine are linked to *ADORA2A* genetic variations.

#### GENETIC INTERPRETATION

#### EVIDENCE RATING ★★★★★

##### Caffeine metabolism:

Based on the *CYP1A1-CYP1A2* and *AHR* genetic findings:

- Your ability to break down and clear caffeine is normal.
- The effects of caffeine can last between 6-8 hours for you.

##### Boosting caffeine metabolism:

- Based on your *CYP1A2* genetic finding, it is unlikely that smoking, consumption of certain foods, or ingesting certain substances will improve or boost your ability to process caffeine.

##### Caffeine, anxiousness and sleep disturbance:

Based on the *ADORA2A* genetic finding:

- You have a moderate risk of experiencing sleep disturbances when larger quantities of caffeine are consumed.
- You have a moderate risk of experiencing anxiousness after consuming caffeine. However, your risk is dependent on how much caffeine you tend to drink regularly. The feeling of anxiousness usually disappears if caffeine is consumed regularly.

#### RECOMMENDATIONS

|  |   |
|--|---|
| <b>Avoid caffeinated drinks before your bed time</b> | <ul style="list-style-type: none"> <li>Based on your combination of genetic results, it would be ideal to leave 8 hours between your last caffeine intake and your intended bedtime.</li> </ul>   |
| <b>Adjust your caffeine intake</b>                   | <ul style="list-style-type: none"> <li>If caffeine causes anxiousness, adjust your intake accordingly.</li> <li>The feeling of anxiousness induced by caffeine will depend on how much and how often you consume caffeine. If you are a light or infrequent caffeine consumer, you may tend to feel its effects more than someone who consumes caffeine regularly.</li> </ul>   |
| <b>Decaffeinated beverages</b>                       | <ul style="list-style-type: none"> <li>Consider switching to decaffeinated beverages for some hours before your intended bedtime.</li> </ul>  |
| <b>Recognize your caffeine limit</b>                 | <ul style="list-style-type: none"> <li>There is currently no globally recognized health-based guidance value— such as an acceptable daily intake— for caffeine. Health authorities from most countries recommend members of the healthy general adult population limit their daily intake of caffeine to 400 mg. For pregnant women, a maximum of 200 mg is recommended.</li> <li>Your ability to tolerate caffeine will also depend on several other non-genetic factors, including how much caffeine you consume and how often it is consumed. Other factors include age, smoking status, exercise routine, whether you are pregnant, taking contraceptive hormones, or have liver disease.</li> </ul>  |
| <b>Caffeine and calories</b>                         | <ul style="list-style-type: none"> <li>When choosing a caffeinated drink, there are a couple of things you should keep in mind. Caffeine content will vary depending on factors including brewing time, size of the cup and how the beverage or food is prepared. One cup of coffee can contain anywhere from 20 mg of caffeine to more than 200 mg depending on these factors.</li> <li>The amount of sugar or milk you add to your coffee and the type of milk used, will impact your total calorie intake.</li> <li>Some caffeinated energy drinks are high in sugar, which will impact your total sugar intake and ultimately your calorie intake.</li> <li>Remember that caffeine is found in plenty of foods and drinks other than coffee. For example, it is found in some cold beverages like sodas or pop, and chocolate.</li> </ul> |



**HEART  
HEALTH**



## CHOLESTEROL AND TRIGLYCERIDES

### GENE

LIPC

### SNPs

rs1800588

### YOUR RESULT

• TT

Two risk variant alleles

### REDUCED ABILITY TO PROCESS DIETARY FATS

#### PREDICTED IMPACT

Increased risk of blood lipid imbalance;  
and  
Increased sensitivity to different types of  
fats in the diet.

#### NUTRITIONAL FACTORS

Total Fat  
Monounsaturated fats

#### RECOMMENDATIONS

- Monitor your lipid profile.
- If cholesterol/ triglyceride levels are elevated:
  - Limit total calories.
  - Limit total fat intake.
  - Favor polyunsaturated fats.
  - Limit monounsaturated fats.
  - Limit saturated fats.
  - Regular vigorous exercise.

#### ABOUT THE GENE

The *LIPC* gene contains the information needed to produce an enzyme called hepatic lipase. This enzyme affects the way your body processes and breaks down dietary fats. There are several types of dietary fats that are found in your blood. These include triglycerides and cholesterol. For cholesterol, you can measure levels of high-density cholesterol (HDL-C), low-density cholesterol (LDL-C) or total cholesterol. While higher levels of HDL-C can be favorable, high LDL-C and triglycerides are not favorable. The *LIPC* gene can influence the overall balance of these fats in your blood, which in turn can affect your overall cardiovascular health.

#### GENETIC INTERPRETATION

#### EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Reduced hepatic lipase enzyme activity.
- Least ability to process and break down dietary fats compared to other genetic results.
- Increased risk of blood lipid imbalance (cholesterol and triglycerides).

Aside from genetic factors, the function of the hepatic lipase enzyme is also affected by other factor such as BMI and intra-abdominal (visceral) fat.

#### RECOMMENDATIONS

#### EVIDENCE RATING ★★★★★

As there may be changes in the overall lipid profile, seek advice from your healthcare practitioner about blood lipid levels testing.  
If cholesterol and/or triglycerides levels are elevated, consider the following dietary and lifestyle interventions:

|   |   |
|---|---|
| <b>Limit total calories</b><br><b>Limit fat intake (20% of total calories)</b>          | <ul style="list-style-type: none"> <li>• One randomized controlled trial has demonstrated that a calorie restricted diet with low dietary fat intake (20% of total calories and low intake of saturated fats) benefited overweight and obese individuals.</li> <li>• This diet resulted in weight loss, increased HDL-C and decreased total cholesterol and LDL-C.</li> </ul> |
| <b>Favor polyunsaturated fats</b>   | Individuals with your genetic result tend to be more sensitive to different types of fats found in the diet. Healthy polyunsaturated fats from foods like nuts, seeds and oily fish (e.g. salmon, mackerel, trout) are favorable for your genetic finding.  |
| <b>Limit monounsaturated fats (from animal products)</b><br><b>Limit saturated fats</b> | Saturated fats and monounsaturated fats (from animal products) have been shown to be unfavorable for your genetic result. Limit your intake of these types of fats in your diet.  |
| <b>Regular vigorous exercise</b>  | Incorporating 75 minutes of regular vigorous exercise each week in addition to dietary interventions may help increase your good cholesterol levels (HDL-C).  |



## TRIGLYCERIDES

## GENE

APOA5

## SNPs

rs662799

## YOUR RESULT

• TT

Two normal alleles

## NORMAL RISK OF ELEVATED TRIGLYCERIDES

## PREDICTED IMPACT

Typical risk of cardiovascular disease; and  
No influence on body weight.

## NUTRITIONAL FACTORS

Wholegrain (Fiber)

## RECOMMENDATIONS

- No specific dietary recommendations for this genetic finding.
- Maintain a balanced diet with adequate intake of wholegrain fiber.
- Seek advice from a healthcare practitioner about further testing if concerned about triglyceride levels.

## ABOUT THE GENE

The APOA5 gene contributes to the regulation of triglyceride levels in your blood. While genetics plays a role in how likely you are to have high triglyceride levels, other factors can also contribute. These include being overweight, consuming excess calories from refined and sugary foods, drinking too much alcohol and having Type 2 diabetes or kidney disease.

## GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- Normal risk of high triglyceride levels.
- No increased cardiovascular risk under 45 years of age.

Your genetic result is only one factor that influences your risk of abnormal triglyceride levels. Your diet and lifestyle are equally as important and will affect your actual triglyceride levels.

## RECOMMENDATIONS

EVIDENCE RATING ★★★★★

No specific diet has been recommended for your result.

Although your genetic finding is not associated with an increased risk of high triglyceride levels, your diet and lifestyle can still contribute to elevated triglyceride levels. Seek advice from your healthcare practitioner if you are concerned about high triglyceride levels.

If triglycerides levels are elevated, dietary and lifestyle interventions are outlined below.

|                           |   |
|---------------------------|---|
| Reduce calorie intake     | This can be achieved by limiting your intake of alcohol, sugar, saturated fats and refined carbohydrates.                                 |
| Increase fiber intake     | Include more wholegrains, legumes and leafy greens in your diet.  |
| Increase omega-3 intake   | This can be achieved by eating foods rich in omega-3 such as fatty fish (salmon, mackerel, trout and sardines) at least 2-3 times a week. |
| Regular moderate exercise | Moderate aerobic exercise, 30 minutes per day, 5 days per week.   |

## ANTIOXIDANT ENZYME AND BLOOD PRESSURE

## GENE

NOS3

## SNPs

rs1799983

## YOUR RESULT

● GG

Two normal alleles

TYPICAL BLOOD PRESSURE  
CONTROL

## PREDICTED IMPACT

No influence on your risk of hypertension and cardiovascular incidence.

## NUTRITIONAL FACTORS

Omega-3

## RECOMMENDATIONS

- No specific dietary recommendations for this genetic finding.
- Seek advice from a healthcare practitioner for further testing if concerned about blood pressure and/or cholesterol levels.

## ABOUT THE GENE

The NOS3 gene encodes for an enzyme that produces nitric oxide. Nitric oxide is an antioxidant that can neutralize free radicals. It also protects against infection and tumor growth, facilitates several biological processes including cell signaling and can dilate (widen) blood vessels. The gene variation that we test for deactivates the NOS3 enzyme, which can result in reduced nitric oxide levels. This has been strongly linked to some cardiovascular conditions such as hypertension.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Normal NOS3 enzyme activity.
- Normal levels of nitric oxide.
- Normal risk of hypertension and cardiovascular incidence.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★★★

**No specific diet is recommended based on this genetic result.**

Although this genetic result has not been associated with hypertension risk and cardiovascular incidence, other factors such as your diet or lifestyle choices may still affect these risks. A healthy, balanced diet is important for maintaining healthy blood lipid levels and blood pressure.

Seek advice from your healthcare practitioner if there are any concerns about blood lipid levels and blood pressure.

## SALT INFLUENCE ON BLOOD PRESSURE

|                         |  |  |   |
|-------------------------|--|--|---|
| <b>GENE</b><br><br>GRK4 | <b>SNPs</b><br><br>rs2960306<br><br>rs1801058<br><br>rs1024323 | <b>YOUR RESULT</b><br><br><div> <span>●</span> GT<br/>           One normal allele and one risk variant allele         </div> <div> <span>●</span> CC<br/>           Two normal alleles         </div> <div> <span>●</span> CT<br/>           One normal allele and one risk variant allele         </div> | <div> <b>MORE SENSITIVE TO DIETARY SALT INTAKE</b><br/><br/> <b>PREDICTED IMPACT</b><br/>           Reduced ability to clear sodium; and Increased risk of high blood pressure with high salt diet.         </div> <div> <b>NUTRITIONAL FACTORS</b><br/>           Salt (Sodium)         </div> <div> <b>RECOMMENDATIONS</b><br/><br/> <ul style="list-style-type: none"> <li>Assess your daily salt intake.</li> <li>Monitor your blood pressure.</li> <li>Limit your salt intake.</li> </ul> </div> |
|-------------------------|--|--|---|

## ABOUT THE GENE

*GRK4* encodes a G protein-coupled receptor called G Protein-Coupled Receptor Kinase 4. *GRK4* is important in helping the kidneys to regulate sodium balance and blood pressure. The two most important pathways to control salt balance and blood pressure in the kidneys are the dopamine pathway and the renin-angiotensin-aldosterone system (RAAS). The dopamine and RAAS pathways regulate blood pressure by reducing sodium re-absorption and promoting sodium excretion. Both of these pathways use G protein-coupled receptors to exert their action.

The genetic change in the *GRK4* gene increases G protein-coupled receptor kinase 4 activity. This leads to impairment and desensitization of the D1R dopamine receptors in the dopamine pathway. The genetic change also leads to a higher expression of angiotensin II receptors in the RAAS pathway, which causes blood vessel constriction, thereby increasing blood pressure. The genetic variation in *GRK4* leads to a reduced ability to clear sodium, especially when dietary sodium intake is high. This increases the risk of high blood pressure.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

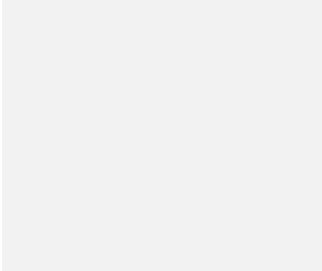
You have the salt-sensitive genotype for *GRK4*. This means that blood pressure can increase by 10% or more with a high-sodium diet.

Your genetic finding is associated with:

- Reduced ability to clear sodium, especially when dietary salt intake is high.
- Increased risk of high blood pressure when the diet is high in salt.
- Greater expression of the angiotensin II receptor. This increases blood vessel constriction and ultimately leads to an increased risk of high blood pressure.

## RECOMMENDATIONS

|  |   |
|--|---|
| <b>Assess your daily intake of salt</b>  | Due to your genetic finding, it is important to be mindful of your salt (sodium) consumption. The WHO recommends less than 5 g of salt (just under 1 teaspoon) per day for adults.  |
| <b>Monitor your blood pressure</b><br><b>Limit intake to 1500 mg of sodium</b> | <ul style="list-style-type: none"> <li>Monitor your blood pressure and discuss your salt intake with a healthcare practitioner.</li> <li>If your blood pressure is raised (higher end of normal or above), seek medical advice from your healthcare practitioner.               <ul style="list-style-type: none"> <li>A further reduction of salt intake to 1500 mg (1.5 g) of sodium (or ¾ of a teaspoon of salt) per day is also advisable.</li> <li>A reduction in salt intake has been correlated with a decrease in blood pressure in this group.</li> </ul> </li> <li>If your blood pressure is normal, it is still important to be mindful of your total salt intake and to make sure that your intake is less than 1500 mg per day.</li> </ul> |
| <b>Dietary tips</b>  | <ul style="list-style-type: none"> <li>Most dietary salt intake comes from salt that is added during food preparation and from salt that is found in processed foods and drinks.</li> </ul>   |

- 
- About 80% of salt in the diet comes from processed foods. Therefore, it is best to try to avoid processed foods due to their high salt content.
  - Aim to eat plenty of natural and unprocessed foods. For example, fresh fruits and vegetables instead of canned, dehydrated or prepackaged foods.
  - Be mindful when adding sauces and condiments to your food. Their salt content is normally quite high. Flavor your food with herbs and spices instead of adding salt.
  - Check nutritional labels at the back of food packaging to find out how much salt (sodium) is in a food product and choose products that are lower in sodium.



**VITAMINS &  
OTHER NUTRIENTS**



## VITAMIN B9 NEEDS

|                      |   |   |   |
|----------------------|---|---|---|
| <b>GENE</b><br>MTHFR | <b>SNPs</b><br>rs1801133<br><br>rs1801131 | <b>YOUR RESULT</b><br><br>• CT<br>One risk variant allele and one normal allele<br><br>• CC<br>Two risk variant alleles | <b>INCREASED RISK OF LOW VITAMIN B9 (FOLATE)</b><br><br><b>PREDICTED IMPACT</b><br>Possible low folate levels;<br>Possible suboptimal riboflavin (vitamin B2) levels;<br>Less response to supplementation;<br>Moderately raised homocysteine levels; and<br>Raised need for vitamin B9.<br><br><b>VITAMINS OR MINERALS</b><br>Vitamin B9 (Folate)<br><br><b>RECOMMENDATIONS</b> <ul style="list-style-type: none"> <li>Monitor your vitamin B9, vitamin B2, and homocysteine levels.</li> <li>Eat vitamin B9 rich foods regularly, e.g. dark leafy greens, broccoli, asparagus, and legumes.</li> <li>Eat vitamin B2 rich foods regularly, e.g. milk, yoghurt, beef, liver, mushrooms, and almonds.</li> <li>Consider L(S)-5-MTHF or folic acid supplementation.</li> </ul> |
|----------------------|---|---|---|

## ABOUT THE GENE

Folate (vitamin B9) and Riboflavin (vitamin B2) are important members of the vitamin B family. Normal vitamin B9 function assists in the formation of your red blood cells, in the optimal production of DNA and in fetal development during pregnancy. One gene that assists in folate and riboflavin metabolism is *MTHFR*. Understanding your *MTHFR* gene can help you to understand your likely levels of folate and homocysteine.

MTHFR converts one form of folate into the most biologically active form (5-MTHF). 5-MTHF is important for a process called methylation which acts as a molecular switch that turns genes on and off. Riboflavin is an important co-factor in this process and is needed for MTHFR to work at full capacity. Disruption in the methylation process leads to increased homocysteine levels, which have been associated with an increased risk of cardiovascular complications, although the significance is unclear at this stage. In pregnant women, this has also been linked to complications such as recurrent pregnancy loss and neural tube defects.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- A significant reduction in the enzyme activity. The level of reduction is likely to be more than 65%.
- Low folate levels.
- Reduced methylation and moderately raised homocysteine levels.
- Possible suboptimal levels of riboflavin (vitamin B2).
- Possible increased risk of hypertension and cardiovascular disorders.
- Less response to short term supplementation aimed at increasing folate.

In women, this finding may increased risk of pregnancy complications like recurrent pregnancy loss and neural tube defects.

As with any vitamin, the practical importance of this result will be influenced by the actual intake of dietary folate.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★★★

## Monitor vitamin B9 and homocysteine levels

- As there is an increased risk of low vitamin B9 (folate) and increased homocysteine levels, a consultation with your healthcare practitioner is advised. Measuring vitamin B9 levels, homocysteine and vitamin B2 levels could be considered.
- Measuring vitamin B12 levels is also recommended before starting folate supplementation as folate may be neurotoxic in the presence of vitamin B12 deficiency.

## Eat vitamin B9 and vitamin B2 rich foods regularly

- The recommended daily intake of folate may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of foods that are rich in vitamin B9 (folate) to ensure that you meet your dietary intake requirements. This is the easiest way to obtain the biologically active form of folate.



#### Consider supplementation with L(S)-5-MTHF or folic acid

- Foods that are rich in folate and folic acid include dark leafy greens, broccoli, asparagus, lentils, beans and folic acid fortified foods.
  - The best way to preserve the vitamin B9 content in food is to consume raw (where possible) or steamed.
  - Eat plenty of foods that are rich in vitamin B2 (riboflavin). These include milk, yogurt, beef, beef liver, mushrooms, almonds, cheese and riboflavin fortified cereals and oats.
- 
- Folic acid and L(S)-5-Methylfolate (L(S)-5-MTHF) are the two main types of supplements routinely used for increasing folate blood levels and lowering homocysteine levels.
  - These supplements have been proven to effectively increase folate levels and lower homocysteine levels. However, 5-MTHF is less likely to mask some of the signs and symptoms of vitamin B12 deficiency compared to folic acid. Folic acid supplementation may lead to overlooking symptoms of vitamin B12 deficiency.
  - A randomized controlled study showed that 1.6 mg of riboflavin (vitamin B2) per day was beneficial for lowering homocysteine levels in individuals with MTHFR variations and may help lower blood pressure in patients with cardiovascular disease, in combination with antihypertensive drugs.

#### SPECIAL CONSIDERATIONS

##### Pregnancy planning Pregnancy

- During pregnancy, having adequate levels of folate is very important for fetal development. To support a healthy pregnancy it is recommended to take folate supplements starting one month before pregnancy and throughout the first trimester. Speak to your healthcare practitioner for further advice.

\* rs1801133 is commonly known as 677C>T while rs1801131 is commonly known as 1298 A>C.

## VITAMIN B6 NEEDS

## GENE

NBPF3

## SNPs

rs4654748

## YOUR RESULT

• CC

Two risk variant alleles

## INCREASED RISK OF LOW VITAMIN B6

## PREDICTED IMPACT

Possible low vitamin B6 levels; and  
Raised need for vitamin B6.

## VITAMINS OR MINERALS

Vitamin B6

## RECOMMENDATIONS

- Monitor your vitamin B6 levels.
- Eat vitamin B6 rich foods regularly, e.g. chickpeas, tuna, liver, salmon, chicken breast, and fortified cereals.
- Consider vitamin B6 supplementation.

## ABOUT THE GENE

The *NBPF3* gene helps to regulate the production of an enzyme that breaks down vitamin B6. Individuals with genetic variations in this gene have been shown to have lower levels of vitamin B6. This is most likely due to a more efficient clearance of vitamin B6. Vitamin B6 is important for immune function, neurological function and red blood cell formation. It is also required for a process called methylation, which acts as a molecular switch to turn genes on and off. Disruption in methylation could lead to raised levels of a molecule called homocysteine which has been linked to various medical conditions.

## GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- Reduced levels of vitamin B6.
- Increased risk of developing low vitamin B6 levels.

As with any vitamin, the practical importance of this result will be influenced by diet and lifestyle. Additional factors, such as alcohol intake, may deplete vitamin B6 levels.

## RECOMMENDATIONS

## Monitor vitamin B6 levels

- As there is an increased risk of low vitamin B6 levels, consultation with your healthcare practitioner is advised. Further action such as blood testing of vitamin B6 may be considered if low levels are suspected.

## Eat vitamin B6 rich foods regularly

- The recommended daily intake of vitamin B6 may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of foods that are rich in vitamin B6 to ensure that you meet your dietary intake requirements.
- Sources of vitamin B6 include chickpeas, tuna, liver, salmon, chicken breast and breakfast cereals fortified with vitamin B6.
- The best way to preserve vitamin B6 content in foods is to eat these foods raw (where possible) or steamed.

## Consider vitamin B6 supplementation

- If vitamin B6 level falls below optimal levels, vitamin B6 supplements can be considered. Vitamin B6 is available in multivitamins with other B complex vitamins, or as a stand-alone supplement.
- Your healthcare practitioner will be able to assess your current vitamin B6 levels and advise whether supplements are needed.

## SPECIAL CONSIDERATIONS

Poor kidney function  
Autoimmune disease  
Alcohol

- Individuals with poor kidney function, autoimmune disease and alcohol dependence are among those at the highest risk of vitamin B6 deficiency.
- Please consult your healthcare practitioner if you have any of these conditions.

## VITAMIN B12 NEEDS

## GENE

FUT2

## SNPs

rs602662

## YOUR RESULT

● AG

One normal allele and one risk allele

## MODERATE RISK OF LOW VITAMIN B12

## PREDICTED IMPACT

Moderately reduced vitamin B12 absorption;  
Possible moderately low vitamin B12 levels; and  
Slightly raised need for vitamin B12.

## VITAMINS OR MINERALS

Vitamin B12

## RECOMMENDATIONS

- Monitor your vitamin B12 levels.
- Eat vitamin B12 rich foods regularly, e.g. fish, meat, poultry, eggs, milk, milk products, and fortified cereals.
- Consider vitamin B12 supplementation.

## ABOUT THE GENE

Vitamin B12 is an essential nutrient that must be obtained from your diet. Many important physiological and metabolic processes, including red blood cell formation and DNA synthesis, as well as neurological function, require vitamin B12 to function properly. The *FUT2* gene produces an enzyme that influences vitamin B12 absorption in the gut.

The *FUT2* gene facilitates the formation and secretion of histo-blood group antigens. Individuals who can produce these antigens are called "secretors", whilst those unable to produce them are called "non-secretors". The secretions allow pathogens such as *Helicobacter Pylori* to adhere to the gut lining. This reduces the amount of intrinsic factor, which is required for vitamin B12 absorption. As such, individuals who are secretors are at a higher risk of low vitamin B12 levels. Secretors are also more susceptible to gut infections from organisms like rotavirus and norovirus which cause diarrhea, including "cruise ship diarrhea".

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Based on your genetic finding, your *FUT2* gene is partially active. This allows partial formation and secretion of the histo-blood group antigens which are associated with:

- Moderately decreased adhesion of pathogens to the gut lining.
- Moderately reduced amount of intrinsic factor, which is required for vitamin B12 absorption.
- Moderate reduction of vitamin B12 absorption in the gut.
- A low to moderate risk of vitamin B12 deficiency.
- Moderately reduced susceptibility to pathogen infections in the gut such as cruise ship diarrhea.

As with any vitamins, the practical importance of this result will be influenced by diet and lifestyle. For example, being a vegetarian will increase the risk of vitamin B12 deficiency because natural sources of vitamin B12 are mainly from animal products.

Please note that adhesion of pathogens may not result in increased risk of infection, inflammation, or increased risk to gut health.

## RECOMMENDATIONS

## Monitor vitamin B12 levels

- As there is an increased risk of vitamin B12 deficiency, a consultation with your healthcare practitioner is advised.
- It is important to consider measuring vitamin B12 levels before taking certain nutritional supplements, such as folate.

## Eat vitamin B12 rich foods regularly

- The recommended daily intake of vitamin B12 may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of foods that are rich in vitamin B12 to ensure that you meet your dietary intake requirements.
- Vitamin B12 is naturally found in animal products which include fish, meat, poultry, eggs, milk and milk products. It is also found in fortified breakfast cereals and some types of nutritional yeast.
- The best way to preserve most of the vitamin B12 in meat and dairy products is to cook them in the oven or on a stovetop. Do not microwave them as this will degrade vitamin B12.

**Consider vitamin B12 supplementation**

- If vitamin B12 level falls below optimal levels, vitamin B12 supplements can be considered.
- Your healthcare practitioner will be able to assess your current vitamin B12 levels and advise whether supplements are needed.

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**SPECIAL CONSIDERATIONS****Vegetarian**

- Vegans and vegetarians are especially at risk of low vitamin B12 levels, as explained above.
- If you follow a vegetarian diet, you should eat eggs and dairy products regularly. You can also consider fortified dairy alternatives like B12-fortified milk alternatives and fortified cereals. If you are struggling to include these foods in your diet, seek advice about supplementation from a healthcare practitioner.

**Vegan**

- If you follow a vegan diet, you are at a higher risk of vitamin B12 deficiency. Make sure you include fortified dairy alternatives like B12-fortified grain or nut milks and fortified cereals in your diet. Seek advice about supplementation from a healthcare practitioner.

**Over 50 years old**

- If you are over 50-years-old, you are more likely to develop vitamin B12 deficiency. This is because the stomach cells in many people over 50 years of age may become damaged and this impairs the absorption of vitamin B12. Seek advice from a healthcare practitioner about the best supplementation plan.

## VITAMIN A NEEDS

## GENE

BCMO1

## SNPs

rs7501331

rs12934922

## YOUR RESULT

● CT

One normal allele and one risk variant allele

● AA

Two normal alleles

## MODERATE RISK OF LOW VITAMIN A

## PREDICTED IMPACT

Moderately reduced conversion of  $\beta$ -carotene to active vitamin A;  
Possible moderately low vitamin A levels;  
and  
Slightly raised need for vitamin A.

## VITAMINS OR MINERALS

Vitamin A

## RECOMMENDATIONS

- Monitor your vitamin A levels.
- Eat vitamin A rich foods, from animal products regularly, e.g. dairy, oily fish, and liver.
- Consider preformed vitamin A supplementation.

## ABOUT THE GENE

Vitamin A is essential for normal growth and development, as well as immune system function, healthy vision and other functions in the human body. Our bodies cannot produce vitamin A. Therefore, most vitamin A is absorbed from the diet. There are two main forms of vitamin A precursors obtained from the diet: provitamin A and preformed vitamin A. Preformed vitamin A is mainly found in animal-based products such as eggs, milk and other dairy products, fatty fish and liver, while provitamin A is mainly found in plant-based foods such as fruit and vegetables.  $\beta$ -carotene is the most abundant form of provitamin A in the diet. *BCMO1* converts provitamin A ( $\beta$ -carotene) into the active form of vitamin A.

Vegans and vegetarians mostly obtain their vitamin A from provitamin A (found in plant-based products). They are at the highest risk of low vitamin A levels when the *BCMO1* enzyme function is reduced.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★

Your genetic finding is associated with:

- Moderately reduced function of the *BCMO1* enzyme.
- Reduced conversion of  $\beta$ -carotene into vitamin A by about 32%.
- Moderate risk of low vitamin A levels.

## RECOMMENDATIONS

## Monitor vitamin A levels

- As there is an increased risk of low vitamin A levels, consult with your healthcare practitioner about further actions such as blood testing and/or direct supplementation.

## Eat vitamin A rich foods regularly

- The recommended daily intake of vitamin A may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of foods that are rich in preformed vitamin A instead of provitamin A to ensure that you meet your dietary intake requirements.
- Sources of preformed vitamin A include dairy products, fatty fish (salmon, herring and tuna) and liver.
- Sources of provitamin A include leafy green vegetables, spinach and broccoli; orange and yellow vegetables such as carrots, peppers and sweet potatoes; fruits such as mangoes, cantaloupes and apricots; and tomatoes.
- To boost provitamin A absorption from plant products, make sure that you have some sort of fat with your vegetables, for example extra-virgin olive oil. This will aid the conversion from the precursor form of vitamin A to the active form.

## Consider preformed vitamin A supplementation

- Supplementation with preformed vitamin A may help to increase vitamin A levels.
- Your healthcare practitioner will be able to assess your current vitamin A levels and advise whether supplements are needed.

## SPECIAL CONSIDERATIONS

**Vegan/Vegetarian**

- Vegans and vegetarians solely rely on provitamin A (found in plant-based products) to meet their dietary intake requirements. When the BCMO1 enzyme function is reduced, they are at the highest risk of low vitamin A.
- If you are a vegan/ vegetarian, supplementation should be carefully discussed with your healthcare practitioner.

**Pregnancy**

- Foods like liver have many nutrients, but even half a portion (30g) of beef liver contains up to three times the recommended daily amount of vitamin A for women. Too much vitamin A can cause complications during pregnancy. If pregnant, or planning on becoming pregnant, it is recommended to limit the amount of liver and liver-derived products in your diet.



## VITAMIN C NEEDS

## GENE

SLC23A1

## SNPs

rs33972313

## YOUR RESULT

• AG

One normal allele and one risk variant allele

## MODERATE RISK OF LOW VITAMIN C

## PREDICTED IMPACT

Reduced vitamin C transport;  
Possible moderately low vitamin C levels;  
and  
Slightly raised need for vitamin C.

## VITAMINS OR MINERALS

Vitamin C

## RECOMMENDATIONS

- Monitor your vitamin C levels.
- Eat vitamin C rich foods regularly, e.g. citrus fruits, red and green peppers, kiwi fruit, broccoli, and strawberries.
- Consider vitamin C supplementation.

## ABOUT THE GENE

Vitamin C is an essential nutrient required for the formation of blood vessels, cartilage, muscle and collagen in bones. It also plays a vital role in the body's healing process. Vitamin C is also an antioxidant and helps to prevent oxidative damage, which is thought to contribute to several diseases. Our bodies are unable to produce vitamin C. Therefore, vitamin C is solely obtained from the diet and is transported across the cell membrane via transporter molecules. The *SLC23A1* gene produces a transporter protein called SLC23A1 which is the major vitamin C transporter in the gut.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding is associated with:

- Reduced vitamin C transport.
- A 10-15% reduction of vitamin C levels.
- Moderate risk of developing low vitamin C levels.

The practical importance of this result will depend on diet, lifestyle and presence of certain medical conditions.

As with any vitamin, the practical importance of this result will be influenced by the actual intake of vitamin C from your diet.

## RECOMMENDATIONS

## Monitor vitamin C levels

- As there is a moderate risk of low vitamin C, a consultation with your healthcare practitioner is advised. Further actions, such as blood testing and/or direct supplementation may be considered.
- This is particularly important if for individuals who are smokers, passive smokers, or have certain gastrointestinal condition preventing vitamin C absorption (see special considerations below).

## Eat vitamin C rich foods regularly

- The recommended daily intake of vitamin C may differ based on age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of foods that are rich in vitamin C to ensure that you meet your dietary intake requirements.
- Vitamin C is found in citrus fruits (for example, oranges and grapefruit), red and green peppers, kiwifruit, broccoli, strawberries and many foods and beverages that are fortified with vitamin C.
- The best way to preserve most of the vitamin C found in fruit and vegetables is to eat them raw. Any food that contains vitamin C should be stored properly by sealing it in an airtight container or refrigerating where appropriate. It should also be consumed within a week of opening.

## Consider vitamin C supplementation

- Supplementation with vitamin C may help to increase vitamin C levels.
- Your healthcare practitioner will be able to assess your current vitamin C levels and advise whether supplements are needed.

## SPECIAL CONSIDERATIONS

**Smokers  
Passive smokers**

- Individuals who are smokers or passive smokers are amongst those at the highest risk of having low vitamin C.
- Supplementation is particularly important for individuals who smoke or are exposed to second hand smoke.
- If you are a smoker, you may require an additional amount of vitamin C per day to help repair cell damage caused by smoking.

**Medications**

- If you are taking certain medications like contraceptive pills, you may have an increased need for vitamin C.

**Physical stress  
Gastrointestinal conditions**

- Infections, burns or exposure to extreme temperatures (very high or very low) can increase your need for vitamin C. In addition, individuals with certain gastrointestinal conditions preventing vitamin C absorption may need to discuss supplementation with a healthcare practitioner.

## VITAMIN D NEEDS

|        |            |                                  |  |
|--------|------------|----------------------------------|--|
| GENE   | SNPs       | YOUR RESULT                      | <b>MODERATE RISK FOR VITAMIN D INSUFFICIENCY</b><br><br><b>PREDICTED IMPACT</b><br>Possible low vitamin D levels; and Slightly raised need for vitamin D.<br><br><b>VITAMINS OR MINERALS</b><br>Vitamin D<br><br><b>RECOMMENDATIONS</b> <ul style="list-style-type: none"> <li>• Monitor your vitamin D levels.</li> <li>• Spend adequate time outdoors in the sun.</li> <li>• Eat vitamin D rich foods regularly, e.g. fatty fish, egg yolk, liver, and vitamin D fortified foods and beverages.</li> </ul> |
| GC     | rs4588     | • CC<br>Two normal alleles       |  |
| CYP2R1 | rs10741657 | • GG<br>Two risk variant alleles |  |
| DHCR7  | rs12785878 | • GG<br>Two risk variant alleles |  |

## ABOUT THE GENE

Vitamin D is an essential nutrient required for calcium absorption in the gut, for cell growth and for immune function. Your daily vitamin D requirement can be obtained from your diet and from exposure to sunlight (specifically UV rays). When UV rays strike the skin, vitamin D starts being produced. Several genes and pathways have been shown to be involved in this process. Genetic variations in the genes selected have been shown to affect the risk of vitamin D insufficiency. The overall risk increases with the presence of each additional risk allele, which is reflected in the overall risk calculated.

The GC gene encodes for the vitamin D-binding protein which binds vitamin D from the diet, sunlight and from supplements and transports it to target organs.

The CYP2R1 gene encodes for an enzyme that converts the inactive form of vitamin D into the most commonly measured form of vitamin D (25(OH)D) in the blood.

The DHCR7 gene encodes for an enzyme that converts a vitamin D precursor (7-DHC) into cholesterol and thereby diverts it away from the vitamin D pathway. This process reduces the amount of substrate available for vitamin D formation.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Based on the genes tested:

- You are at a moderate risk of vitamin D insufficiency (<50nmol/L).
- The combined genetic risk for vitamin D insufficiency increases by about 40% with your genetic combination.

The clinical significance of this finding will also depend on your existing vitamin D intake and exposure to sunlight.

## RECOMMENDATIONS

## Monitor your vitamin D levels

- As there is a moderate risk of vitamin D insufficiency, a consultation with your healthcare practitioner is advised. This may include a blood test or vitamin D3 supplementation.
- Factors that can affect your vitamin D levels include BMI (being underweight, overweight, or obese), skin color, physical activity levels, vitamin D intake, calcium intake, daily sun exposure, season, pregnancy and age.

## Spend adequate time outdoors in the sun

- The recommended daily intake of vitamin D may differ based on age and life stage. Please consult with your healthcare practitioner for further advice.
- In general, the daily recommended amount can be obtained by spending more time outdoors during daylight hours and consuming vitamin D rich foods.
- As a general advice, to obtain 10,000 IU of vitamin D from the sun:
  - Individuals with fair skin tones – about 10 mins (arms or equivalent exposed and no sunscreen).
  - Individuals with darker skin tones (olive skin or medium skin tones) – 15-20 mins (arms or equivalent exposed and without sunscreen).
  - Individuals with deep skin tones – 60 minutes sun exposure (arms or equivalent exposed and without sunscreen).

Please note that the amount of vitamin D that can be obtained by exposure to sunlight depends on several factors including genetics, season, skin type and geographic latitude.

**Eat vitamin D rich foods regularly**

- You can also meet your dietary intake by eating plenty of vitamin D rich foods.
- Sources of vitamin D include fatty fish, egg yolk, liver, vitamin D fortified foods.

**SPECIAL CONSIDERATIONS****Over 50 years old**

- If you are over 50, and especially if you are a woman, you may need even more vitamin D. With age, your body's ability to make and activate vitamin D decreases. You can discuss this with a healthcare practitioner for advice on supplementation.

**Vegan**

- If you are a vegan you may have an even higher risk of vitamin D deficiency without adequate sunlight or supplementation. Make sure you include vitamin D fortified milk alternatives in your diet and seek advice from a healthcare practitioner about supplementation.

**Vegetarian**

- If you are a vegetarian who does not include milk in your diet, you may have an even higher risk of vitamin D deficiency without adequate sunlight or supplementation. Make sure you include vitamin D fortified milk alternatives in your diet and seek advice from a healthcare practitioner about supplementation.

## CALCIUM, BONE STRENGTH AND STRESS FRACTURE

|   |             |   |  |
|---|-------------|---|--|
| <b>GENE</b>   | <b>SNPs</b> | <b>YOUR RESULT</b>  | <b>MODERATE RISK OF STRESS FRACTURE (WITH LOW CALCIUM INTAKE)</b>  |
| GC  | rs7041      | <div>● <b>TT</b></div> <div>Two risk variant alleles</div>                      | <b>PREDICTED IMPACT</b><br>Slightly raised need for calcium;<br>Lower bone mineral density with low calcium intake;<br>Greater risk of stress fracture; and<br>Possible low vitamin D levels.  |
| VDR   | rs1544410   | <div>● <b>CT</b></div> <div>One normal allele and one risk variant allele</div> |  |
| <b>ABOUT THE GENE</b><br><p>The <i>GC</i> gene encodes for the vitamin D binding protein, which binds and transports vitamin D to target organs. The genetic variation tested has been shown to affect the abundance of vitamin D transport molecules and therefore affects vitamin D levels. Vitamin D helps with calcium absorption from the gut and into the bloodstream. Therefore, having adequate vitamin D levels is essential for maintaining calcium levels.</p> <p>The <i>VDR</i> gene encodes for the vitamin D receptor (VDR). This receptor allows the body to regulate the activity of genes that are dependent on vitamin D. By turning these genes on or off, <i>VDR</i> helps to control calcium absorption and other processes.</p> <p>Calcium is an essential nutrient that must be obtained from the diet. Most of your calcium supply is stored in your bones and teeth, where it supports their structure and function. Genetic changes that affect the balance of calcium and vitamin D have been shown to affect calcium absorption and bone strength. This increases the risk of osteoporosis and leads to a greater risk of stress fractures.</p> |             |   | <b>VITAMINS OR MINERALS</b><br>Calcium<br>Vitamin D  |
|   |             |   | <b>RECOMMENDATIONS</b> <ul style="list-style-type: none"> <li>Monitor your calcium and vitamin D levels.</li> <li>Eat calcium rich foods regularly, e.g. milk, yoghurt, cheese, canned fish with bones, green leafy vegetables, legumes, and fortified dairy-free milks.</li> <li>Consider calcium supplementation.</li> </ul> |

### GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- Lower bone mineral density (BMD) if calcium intake is low.
- Greater risk of stress fractures (2-times more likely).
- Mildly reduced vitamin D levels, which may affect calcium absorption. The significance of this will depend on existing vitamin D intake and exposure to sunlight.
- Increased need for calcium and vitamin D.

The clinical significance of this finding will also depend on calcium and vitamin D intake.

### RECOMMENDATIONS

EVIDENCE RATING ★★★★★

**Monitor calcium levels**  
**Consider calcium supplementation**

- As there is a moderate risk of stress fracture with low calcium intake, a consultation with your healthcare practitioner is advised for further action.
- The practitioner should be able to assess calcium and vitamin D intake and check their levels. Based on the assessment, the practitioner may advise calcium and vitamin D3 supplementation.
- A randomized placebo-controlled trial showed that individuals with this genetic variation requires at least 900 mg of calcium daily to help prevent low calcium levels which can lead to low BMD and an increased risk of fractures.

**Eat calcium rich foods regularly**

- The recommended daily intake of calcium may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.
- Eat plenty of calcium rich foods to ensure that you meet your dietary intake requirements.
- Foods that are rich natural sources of calcium include milk, yoghurt, cheese, canned fish with bones, green leafy vegetables, legumes, and fortified dairy-free milks.

- Choose kale, broccoli and cauliflower over spinach and silverbeet / swiss chard. The latter ones have good calcium content but also contain a substance (oxalate) which inhibits calcium absorption.

## SPECIAL CONSIDERATIONS

|                            |   |
|----------------------------|---|
| <b>Vegan</b>               | <ul style="list-style-type: none"> <li>• If you are vegan, you may be at an even higher risk of having low calcium levels as you do not eat dairy products. You might also absorb less calcium because you consume more of those plant products containing substances which may inhibit calcium absorption. Make sure you include calcium-fortified milk alternatives and plant products in your diet. Soaking nuts and legumes helps to reduce their anti-nutrient content, thus maximizing calcium absorption. Seek advice from a healthcare practitioner about supplementation if needed.</li> </ul> |
| <b>Vegetarian</b>          | <ul style="list-style-type: none"> <li>• If you are vegetarian, you might absorb less calcium because you consume more plant products containing substances which may inhibit calcium absorption. Soaking nuts and legumes helps to reduce their anti-nutrient content, thus maximizing calcium absorption. Make sure you include calcium-fortified milk alternatives in your diet. Seek advice from a healthcare practitioner about supplementation if needed.</li> </ul>  |
| <b>Over 50 years old</b>   | <ul style="list-style-type: none"> <li>• If you are a woman over 50, you may need even more calcium. This is because, with age, bone loss increases and your body's ability to absorb calcium decreases due to a decrease in stomach acid. You can seek advice about supplementation from a healthcare practitioner.</li> </ul>   |
| <b>Lactose intolerance</b> | <ul style="list-style-type: none"> <li>• If you limit or avoid dairy products, you may be at a higher risk of low calcium levels. Make sure you include calcium-fortified milk alternatives in your diet. Seek advice from a healthcare practitioner about supplementation if needed.</li> </ul>  |
| <b>Kidney disease</b>      | <ul style="list-style-type: none"> <li>• Speak with your healthcare practitioner regarding supplementation, especially if you have kidney disease.</li> </ul>   |

## IRON NEEDS

|                 |                   |  |   |
|-----------------|-------------------|--|---|
| GENE<br>TMPRSS6 | SNPs<br>rs4820268 | YOUR RESULT<br>● AG<br>One normal allele and one risk variant allele | <b>INCREASED RISK OF LOW IRON LEVELS</b><br><br><b>PREDICTED IMPACT</b><br>Reduced iron levels, iron storage and transport;<br>Reduced hemoglobin concentration;<br>Increased risk of iron deficiency and iron deficiency anemia; and<br>Raised need for iron.<br><br><b>VITAMINS OR MINERALS</b><br>Iron<br><br><b>RECOMMENDATIONS</b> <ul style="list-style-type: none"> <li>• Monitor your iron levels.</li> <li>• Eat iron rich foods regularly, e.g. red meat, fish, shellfish, poultry, green leafy vegetables, legumes, oysters, dried fruits and iron fortified cereals.</li> <li>• Consider iron supplementation.</li> </ul> |
| TF              | rs3811647         | ● AG<br>One normal allele and one risk variant allele                |   |

## ABOUT THE GENE

Iron is an essential nutrient that is obtained from the diet. It is an important component of hemoglobin, the molecule in red blood cells that carries oxygen. If adequate iron is not available, cells and tissues will not get enough oxygen. This causes signs and symptoms of iron deficiency anemia, which include tiredness (fatigue), weakness and pale skin.

The *TF* gene contains the information needed to produce a protein called transferrin. Transferrin binds and transports iron throughout the body. Transferrin controls the levels of free iron in our blood and is a good indicator of how much iron is available to our tissues.

The *TMPRSS6* gene helps to control our iron levels by controlling hepcidin, a key regulator of iron in the body. When iron levels are low, *TMPRSS6* can increase iron concentrations by inhibiting the production of hepcidin. This increases the amount of iron that can be absorbed from the diet and allows more iron to be transported out of storage sites in the liver and spleen.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- An overall reduction of iron levels in the blood.
- Reduced ability of transferrin to bind to iron.
- Reduced iron transport to tissues.
- Reduced iron storage (ferritin) levels.
- Reduced hemoglobin concentration. This finding is confirmed in several populations, including Europeans and Asians. The greatest effect is seen in the Asian population.
- Increased risk of iron deficiency and iron deficiency anemia. As such, there is a reduced risk of iron overload.

The practical importance of this result will depend on your dietary habits, whether you are pregnant or a blood donor and other factors.

## RECOMMENDATIONS

|                               |   |
|-------------------------------|---|
| Monitor iron levels           | <ul style="list-style-type: none"> <li>• As there is an increased risk of low iron levels, consult your healthcare practitioner about getting your iron levels tested.</li> <li>• It is important to keep your iron levels within the recommended range. Too much or too little could result in undesirable health implications.</li> </ul>   |
| Eat iron rich foods regularly | <ul style="list-style-type: none"> <li>• The recommended daily intake may differ based on gender, age and life stage. Please consult with your healthcare practitioner for further advice.</li> <li>• Eat plenty of foods that are rich in iron to ensure that you meet your dietary intake requirements.</li> <li>• Iron-rich foods include red meats, fish, shellfish, poultry, green leafy vegetables, legumes, oysters, dried fruits and iron fortified cereals.</li> </ul> |



|                               |   |
|-------------------------------|---|
|                               | <ul style="list-style-type: none"><li>Heme-iron contained in animal products can be readily absorbed by your body, while iron from plant sources (non-heme) is less readily absorbed. To increase your iron absorption from plant products, make sure you combine foods that contain iron with foods that contain vitamin C. For example, add some red capsicum/peppers to a lentil stew. Also, cooking in iron pots or skillets will increase the iron content of foods.</li></ul> |
| Consider iron supplementation | <ul style="list-style-type: none"><li>If low levels of iron are detected, iron supplementation may be considered to help increase iron levels.</li><li>Your healthcare practitioner will be able to assess your current iron levels and advise whether supplements are needed.</li></ul>  |

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#### SPECIAL CONSIDERATIONS

|                   |   |
|-------------------|---|
| Females           | <ul style="list-style-type: none"><li>If you are a woman of reproductive age, your body needs even more iron as menstruation increases the need for iron.</li></ul>   |
| Vegan/ vegetarian | <ul style="list-style-type: none"><li>If you are a vegan/ vegetarian, you may need almost twice as much iron as non-vegan/ vegetarians. Keep in mind that even though some vegetables like spinach are rich in iron, they also contain substances (oxalates) that decrease iron absorption.</li></ul> |

## OMEGA-3 AND OMEGA-6 PROCESSING

## GENE

FADS1

## SNPs

rs174546

## YOUR RESULT

● CC

Two normal alleles

## NORMAL FATTY ACID PROCESSING

## PREDICTED IMPACT

Typical proportion of different types of fatty acids in the body;  
No influence on risk of blood lipid imbalance; and  
Typical need for omega-3.

## VITAMINS OR MINERALS

Omega-3

## RECOMMENDATIONS

- Maintain a balanced diet with omega-3 rich foods.
- Hero foods: fatty fish, nuts and seeds (walnuts, flaxseeds, and chia seeds).

## ABOUT THE GENE

Fats are made of fatty acids, which can come from dietary sources, but are also produced in small amounts by the body. Fatty acids come in different types, such as short or long, saturated or unsaturated and can be grouped into further subtypes, like omega-3 and omega-6. Your body processes fatty acids and rearranges them to produce all the different types. *FADS1* is specifically involved in the processing and production of unsaturated omega-3 and omega-6 types. Omega-3 and omega-6 fatty acids are essential for development, reproduction, skin and hair growth and for brain function. Additionally, they can also influence the balance of blood triglycerides and cholesterol (lipids). As such, *FADS1* also has an impact on the lipid profile.

## GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding is associated with:

- Normal *FADS1* enzyme activity.
- Normal capacity to process omega-3 and omega-6 fatty acids.
- Typical proportion of different types of fatty acids in your blood.

Your genetic finding is not associated with an increased risk of high triglycerides or a high level of low-density cholesterol (LDL-C). The clinical significance of this finding will depend on usual omega-3 intake and other dietary habits.

## RECOMMENDATIONS

EVIDENCE RATING ★★★★★

## Maintain a balanced diet with omega-3 rich foods

- Please be advised that other factors, such as your dietary or lifestyle choices, may still affect your overall lipid profile.
- A healthy, balanced diet is essential to ensure adequate omega-3 intake and for maintaining a healthy lipid balance in the blood.
- The recommended daily intake may differ based on age, gender and life stage. Please refer to your country's guideline.
- If cholesterol and/or triglycerides levels are known to be raised, consult your healthcare practitioner about suitable treatment.

## Hero foods

- In general, the daily recommended amount can be obtained from omega-3 rich foods such as fatty fish (salmon, mackerel and trout) and nuts and seeds (walnuts, flaxseeds, and chia seeds).
- Eat up to 3 servings of fatty fish per week to maximize the benefits of omega-3 content and minimize the risks of mercury contamination.

## SPECIAL CONSIDERATIONS

## Vegan/ vegetarian

- As the most beneficial types of omega-3 are found in fatty fish, supplementation should be discussed with your healthcare practitioner.



**FITNESS  
& EXERCISE**



## MUSCLE POWER

## GENE

ACTN3

## SNPs

rs1815739

## YOUR RESULT

• CT

One normal allele and one variant allele

## INCREASED POWER

## PREDICTED IMPACT

Your fast-twitch muscle fibers are partially equipped for sudden bursts of activity; Moderate increase in muscle size with high intensity exercise; and More prone to muscle soreness and muscle injury.

## FITNESS PROFILE

Power vs Endurance  
Recovery

## RECOMMENDATIONS

- High and low intensity training to improve your fitness and strength.
- For muscle soreness, consider additional rest days.

## ABOUT THE GENE

Your muscles contain two types of fibers: fast-twitch and slow-twitch. Fast-twitch fibers are useful for movements relying on sudden, intense bursts of activity, such as those required in power sports (e.g. weight-lifting, sprinting, high jump, long jump and pole vault). Slow-twitch fibers are useful for long-duration, low intensity activities (e.g. walking, jogging and cycling). The ACTN3 gene builds a protein that allows fast-twitch muscle fibers to work at full force. The more ACTN3 protein your body produces, the greater your muscle power.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★★★

Your genetic finding predicts partial production of ACTN3 protein. This on one hand means:

- You are moderately suited to sports that rely on sudden bursts of power, like weight-lifting or sprinting.
- Your muscles will moderately increase in size in response to high intensity exercise. This is an advantage in sports that require strength and power.

On the other hand:

- You need to take care with high intensity training as you may experience soreness afterwards and risk muscle injury. This may slow your recovery time. Your overall recovery ability presented in part A of this report (summary of results) is influenced also by other genes.

This result is 7-8 times more likely to be found in Olympic level sprinters. This result is also common in elite performers across a wide range of power sports including judo, cycling and ski jumping.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★

## High and low intensity training

You are suited to both high intensity exercise (e.g. High Intensity Interval Training (HIIT) and team sports like basketball and soccer) and low intensity activities (e.g. swimming, jogging, yoga and pilates).

To improve strength and grow muscles in size, both high or low intensity resistance training may be used: high intensity focuses on heavier weights with fewer sets and repetitions; low intensity focuses on slow movements, lighter weights and more sets and repetitions.

Note: Your overall power or endurance; and recovery profiles presented in part A of this report takes into consideration this result in combination with other gene results.

## MUSCLE STRENGTH

## GENE

AGT

## SNPs

rs699

## YOUR RESULT

● TT

Two normal alleles

## NORMAL MUSCLE STRENGTH

## PREDICTED IMPACT

Normal muscle contraction and strength;  
and  
Normal muscle power.

## FITNESS PROFILE

Power vs Endurance  
Stamina

## RECOMMENDATIONS

- Follow general training recommendations.
- Train more frequently.

## ABOUT THE GENE

The *AGT* gene produces a protein that helps muscles to contract properly and maintain their strength. The more protein a muscle produces, the greater its strength and power. This protein is also thought to increase the production of fast-twitch fibers, which provides an advantage in power sports.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding predicts normal production of the AGT protein. This means:

- Your muscle contraction is functioning normally.
- You are expected to have normal muscle power.

This result is not as commonly found in Olympic athletes of various disciplines.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★

**Follow general training recommendations**

You can follow general training recommendations to improve your muscle power. You may need to train more frequently than others to achieve the same results.

Note: Your overall power or endurance profile presented in part A of this report takes into consideration this result in combination with other gene results.

## MUSCLE ENERGY

## GENE

AMPD1

## SNPs

rs17602729

## YOUR RESULT

● CC

Two normal alleles

## IDEAL ENERGY

## PREDICTED IMPACT

Maximum production of muscle energy in short bursts;  
Capable of pushing yourself without getting tired too quickly; and  
Less muscle soreness after intense training.

## FITNESS PROFILE

Power vs Endurance  
Recovery

## RECOMMENDATIONS

- Mix high and low intensity training to improve your fitness and strength.

## ABOUT THE GENE

Your muscle cells need energy to contract and move your body. The *AMPD1* gene produces a protein that is involved in the production of energy that is used by muscles. This energy is used during short bursts of exercise and is also important for combating muscle fatigue.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding predicts normal production of the AMPD1 protein. This means:

- Your muscles are equipped to produce maximum energy in short bursts and you can push yourself to maximum effort without getting tired too quickly.
- You are less prone to experience muscle soreness after intense exercise. This can speed up your recovery time. Your overall recovery ability presented in part A of this report (summary of results) is also influenced by other genes.

About 70-90% of elite power athletes (e.g. short distance runners, short distance swimmers, weightlifters, cyclists) have this genetic result.

## RECOMMENDATIONS

## EVIDENCE RATING ★★

## High and low intensity training

Based on your result, both high and low intensity training will increase your fitness and strength.

- High intensity training, e.g. HIIT, which is short bursts of exercise at maximal effort followed by varied recovery times.
- Low intensity training, e.g. brisk walking, cycling, swimming, jogging.

To train your muscles, you can alternate high intensity resistance training (with heavier weights and fewer sets and repetitions) with low intensity resistance training (with lighter weights and more sets and repetitions).

Note: Your overall power or endurance; and recovery profile presented in part A of this report takes into consideration this result in combination with other gene results.

## ENDURANCE

## GENE

PPARGC1A

## SNPs

rs8192678

## YOUR RESULT

● GG

Two normal alleles

## PEAK ENDURANCE

## PREDICTED IMPACT

Naturally high aerobic fitness;  
Maximum growth of slow-twitch muscle fibers in response to exercise; and  
Well suited to endurance training.

## FITNESS PROFILE

Power vs Endurance  
Stamina

## RECOMMENDATIONS

- Endurance training.
- Lighter weights with more sets and reps.

## ABOUT THE GENE

The *PPARGC1A* gene helps to regulate how energy is used in muscle cells. Increased energy levels are linked to increased aerobic fitness and the ability to exercise for longer periods of time. This gene also regulates the ability to grow slow-twitch muscle fibers which also contributes to increased endurance performance.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your *PPARGC1A* protein is working normally. This means:

- Your muscles can grow their slow-twitch fibers with exercise. This makes you more suited to endurance training (e.g. long-distance swimming, and running).
- Your aerobic fitness is naturally high.

About half of elite endurance athletes share this genetic result.

## RECOMMENDATIONS

## Endurance training

You are suited to exercises that can be sustained for a longer period of time. These are low intensity activities that engage your slow-twitch muscle fibers. Examples include jogging, running, swimming and cycling.

For gym work, you can focus on low intensity resistance training with lighter weights and a greater number of sets and repetitions.

Note: Your overall power or endurance; and stamina profile presented in part A of this report takes into consideration this result in combination with other gene results.



## RECOVERY TIME

## GENE

IL6

## SNPs

rs1800795

## YOUR RESULT

• GG

Two normal alleles

## FASTER RECOVERY

## PREDICTED IMPACT

Optimal regeneration of muscle fibers;  
Less muscle soreness after intense training;  
Shorter recovery time; and  
Naturally suited for power sports.

## FITNESS PROFILE

Power vs Endurance  
Stamina  
Recovery

## RECOMMENDATIONS

- There are no specific recommendations for this genetic result.
- As recovery is less likely to be an issue, you can train most days.

## ABOUT THE GENE

The *IL6* gene produces a substance called interleukin-6. It is released in the muscles in response to exercise. It promotes fiber regeneration and regulates how quickly muscles recover after exercise. It is also thought that having normal *IL6* gene function contributes to better performance in power sports.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding predicts normal levels of IL6 production. This means:

- You may experience less muscle soreness than others after intense exercise.
- You are likely to recover faster after intense exercise and are therefore likely to be able to train on most days. However, your overall Recovery profile presented on part A of this report (summary of results) is also influenced by other gene results.
- With appropriate training, you are likely to achieve some improvements in your stamina. However, your overall Stamina profile presented on part A of this report (summary of results) is also influenced by other gene results.
- You may be naturally suited to power sports (e.g. sprinting, weight-lifting, long jump and high jump). However, your overall Power or Endurance profile presented on part A of this report (summary of results) is also influenced by other gene results.

About 50-60% of elite athletes in power sports have this genetic result.

## RECOMMENDATIONS

## Training on most days

There are some foods that can help you recover after intense training:

- Drinking a glass of milk within 10 minutes of exercising can help keep muscle soreness down and reduce muscle damage.
- Curcumin can help to reduce a loss in muscle strength. It can be found in turmeric and ginger. Certain drinks such as turmeric lattes may be of benefit.
- Taking ginger before exercise can also accelerate recovery of muscle strength following intense exercise.
- Drinking tart cherry juice before and after training may reduce muscle soreness.

Note: Your overall power or endurance profile; stamina; and recovery profile presented in part A of this report takes into consideration this result in combination with other gene results.

## RISK OF SOFT TISSUE INJURY

## GENE

COL1A1

## SNPs

rs1800012

## YOUR RESULT

● GG

Two normal alleles

## NORMAL RISK OF SOFT TISSUE INJURY

## PREDICTED IMPACT

Normal joints support; and  
Normal risk of tendon and ligament injuries.

## FITNESS PROFILE

Injury Risk

## RECOMMENDATIONS

- Ensure adequate warm up.
- Strengthen your supporting muscles.
- Stretch regularly.
- Improve technique and body awareness.

## ABOUT THE GENE

The *COL1A1* gene builds the main collagen chain that affects the strength of ligaments, tendons and joint capsules. This strength affects the mobility of joints such as shoulders, knees and ankles. Greater levels of this type of collagen provide better supported joints and a reduced risk of injury.

## GENETIC INTERPRETATION

## EVIDENCE RATING ★★★

Your genetic finding predicts:

- Normal production of COL1A1 protein.
- Normal risk of ligament and tendon injury. This may include anterior cruciate ligament (ACL) or Achilles tendon injuries, or shoulder dislocation.

## RECOMMENDATIONS

## EVIDENCE RATING ★★★★★

|                                      |   |
|--------------------------------------|---|
| Adequate warm up                     | A comprehensive warm up program will help prepare the body for exercise by gradually increasing the heart rate and blood flow to the muscles.   |
| Strengthen your supporting muscles   | Strengthening supporting muscles can reduce imbalances in the body and prevent injury. For example, strengthening exercises for the hamstrings, quadriceps and gluteus maximus could support the muscles around the ligament and prevent injury of the knee e.g. ACL injuries.  |
| Regular stretching                   | Regular stretching can reduce muscle tightness. Tightness has been shown to increase the risk of certain injuries. For example, tight calf muscles are associated with an increased risk of Achilles tendon injuries as they place more stress on the Achilles tendon.  |
| Improve technique and body awareness | 70% of ACL injuries occur without contact to the region. For example, injuries can be caused by landing, pivoting or stopping suddenly. Research shows that Neuromuscular Training can be highly effective in reducing the risk of ACL injuries in athletes who play sports. Neuromuscular training includes exercises that improve strength, balance, agility and flexibility and is highly-specific for sports that pose a high risk of ACL injuries (e.g. soccer). This type of training focuses on training the knee to move in a correct way, especially when jumping, landing and pivoting. |

Note: Your overall injury risk profile presented in part A of this report takes into consideration this result in combination with other gene results.

## INJURY RISK AND FLEXIBILITY

## GENE

COL5A1

## SNPs

rs12722

## YOUR RESULT

● CC

Two normal alleles

NORMAL RISK OF TENDON INJURY  
AND REDUCED JOINT FLEXIBILITY

## PREDICTED IMPACT

Better joint flexibility;  
Normal risk of tendon injury; and  
Normal risk of muscle cramping from exercise.

## FITNESS PROFILE

Injury Risk

## RECOMMENDATIONS

- There are no specific recommendations for this genetic result.
- General recommendations to prevent injuries:
  - Ensure adequate warm up and cool down.
  - Stretch after exercising.
  - Do strengthening exercises.

## ABOUT THE GENE

The COL5A1 gene produces the protein collagen 5 which affects the structure and function of collagen in ligaments and tendons. The amount of collagen and how it is packed influences ligament strength. It also influences your range of motion and the flexibility of joints.

## GENETIC INTERPRETATION

EVIDENCE RATING ★★★★★

Your genetic finding indicates that your supply of collagen 5 is ideal. This means that:

- You are likely to have flexible joints.
- You have a normal risk of tendon injury (including tennis elbow and injuries to the Achilles tendon).
- You have a normal risk of muscle cramping from exercise.

## RECOMMENDATIONS

EVIDENCE RATING ★★★

No specific recommendation for this genetic finding

Even if this genetic result does not put you at higher risk of soft tissue injury, care should still be taken during activities that are commonly associated with injuries. These include sports that require short bursts of energy, such as sprinting and jumping, or sports that require sudden starting and stopping.

To decrease risk of injuries during sport, these general recommendations are suggested:

- Having an adequate warm up and cool down.
- Stretching after exercises.
- Strengthening activities that are suitable to individual sports.

Note: Your overall injury risk profile presented in part A of this report takes into consideration this result in combination with other gene results.



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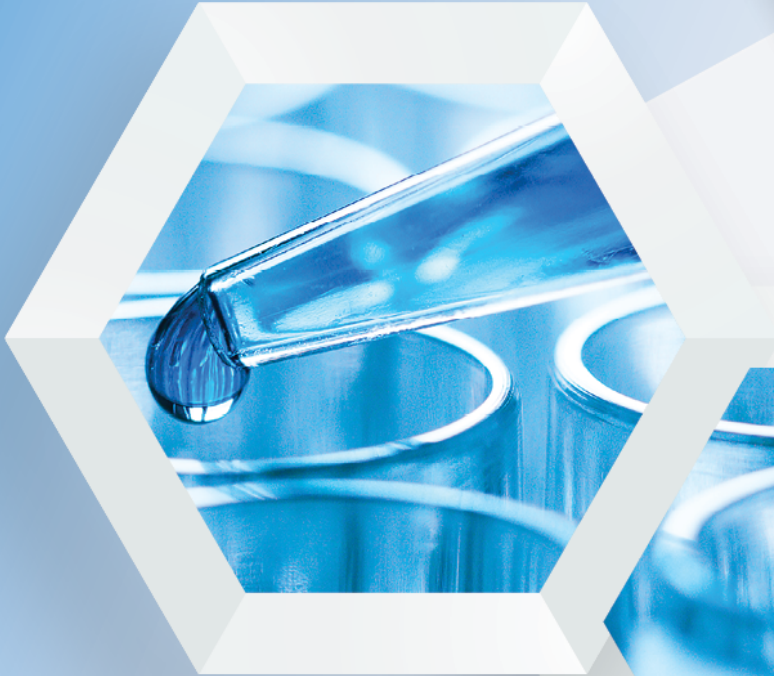
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**EVIDENCE  
RATING SCALE**



We have developed a ratings system so that you can see our level of confidence in the research that we have used as a basis for our recommendations. This is based on Oxford Centre for Evidence Based Medicine – Level of Evidence, March 2009\* and has been modified to apply for genetic tests.

| LEVEL | CAUSATION AND TREATMENT   |
|-------|---|
| ★★★★★ | Systematic review of multiple RCT (meta-analysis)<br>Systematic review of meta-analyses<br>Single RCT (random controlled trial) with narrow confidence intervals                  |
| ★★★★★ | » Meta-analysis of cohort studies<br>» Prospective cohort with 80% follow up.<br>» Single RCT not in 5<br>» Good quality ecological research<br>» Genome-wide association studies |
| ★★★   | Multiple case control studies<br>Meta-analysis of case control<br>Follow up cohort <80%<br>Cross sectional studies >1000 people<br>Case control good quality                      |
| ★★    | » Single case control not in 3<br>» Case-series<br>» Cross sectional <1000 people   |
| ★     | Single case report<br>Expert opinion<br>Biochemistry<br>First principle<br>Animal/bacteria analogy  |

\*<http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/>





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