

# UNLOCK YOUR POTENTIAL



**BRUCE WAYNE**

MMG000000MFG0000000

Date of Birth: 27 - May -1939

Caucasian / Male

*Report Date: 21<sup>st</sup> June 2018*

myfitgene™

mapmygenome™  
Know Yourself

**21<sup>st</sup> June 2018**

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Dear Customer,

*\*Personal Message from  
the CEO*



“Without both genes and environment, there are no outcomes”

*David Epstein, The Sports Gene*

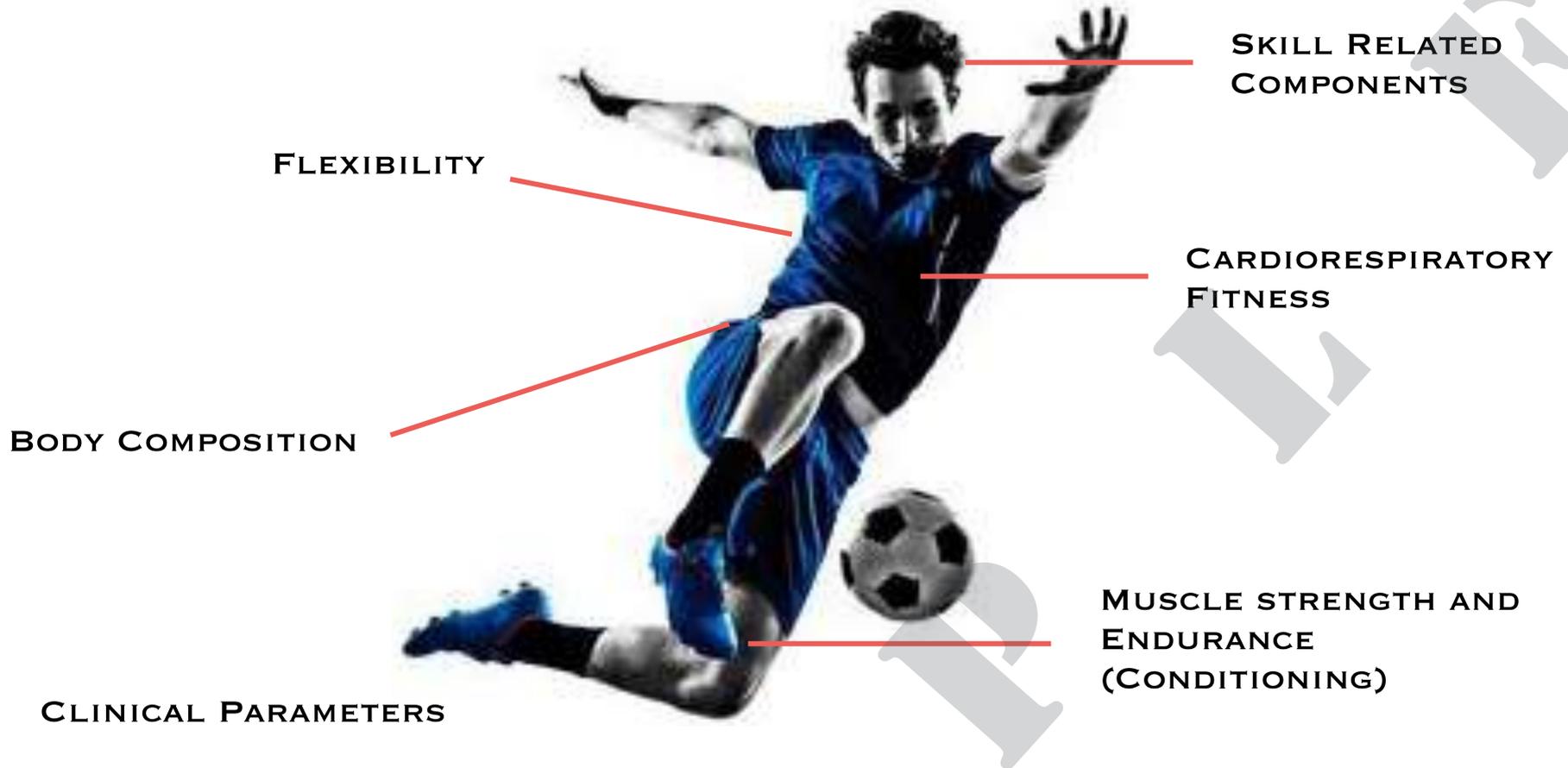
## Introduction to MyFitGene™

Athletic performance is affected by genetic, environmental and lifestyle (diet and training) factors. Muscle mass, strength, recovery, oxygen intake, body composition, metabolism, training and diet are among the factors that determine performance at any sport. Aerobic/anaerobic respiration, mind-muscle training, stamina and recovery time all come into play when your body is involved in high-intensity activity.

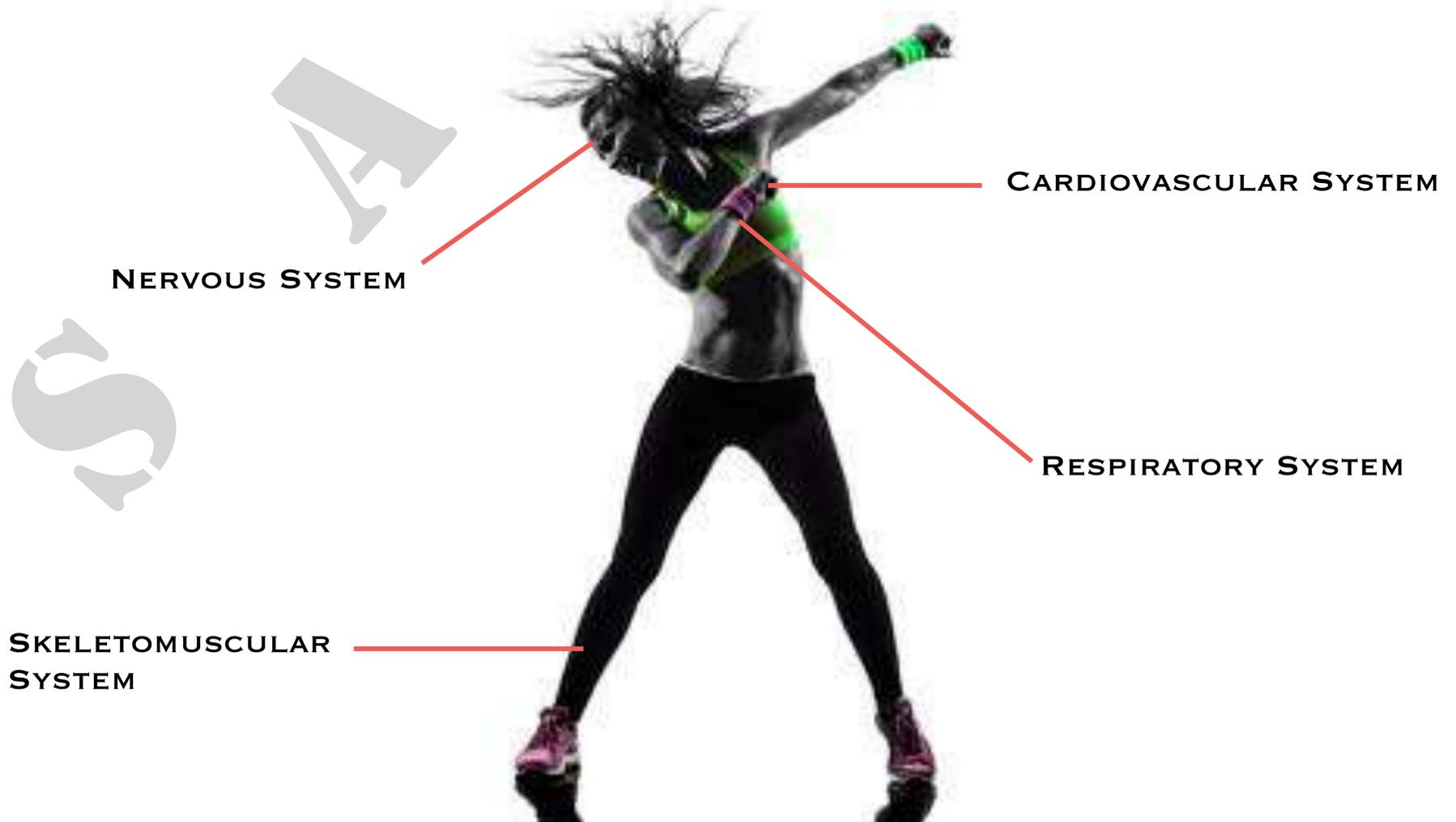
If you are an aspiring athlete, the presence or absence of well-timed training that's targeted towards overall growth can make or break dreams. For maximal output, continuous improvement of physical ability and management of existing vulnerabilities is essential.



**Key Focus Areas**  
 (Important parameters assessed in athletes):



**Key Biological Systems**  
 (which are involved in athletic performance):





# How does MyFitGene™ enhance your athletic prowess?

MyFitGene™ brings DNA testing to the fore. The test has been designed in an effective manner to target major aspects which impact sports performance. From heart health to nutrient levels, genes regulate a significant portion of the exercise physiology, anatomy and kinesiology.

## What you can uncover:



**Diet**

Vitamins, fat and carb conversion, BMI and energy expenditure, detox capacity, gluten intolerance

**Physical Fitness**

Muscle, bone, lipid profile, injury risk and recovery



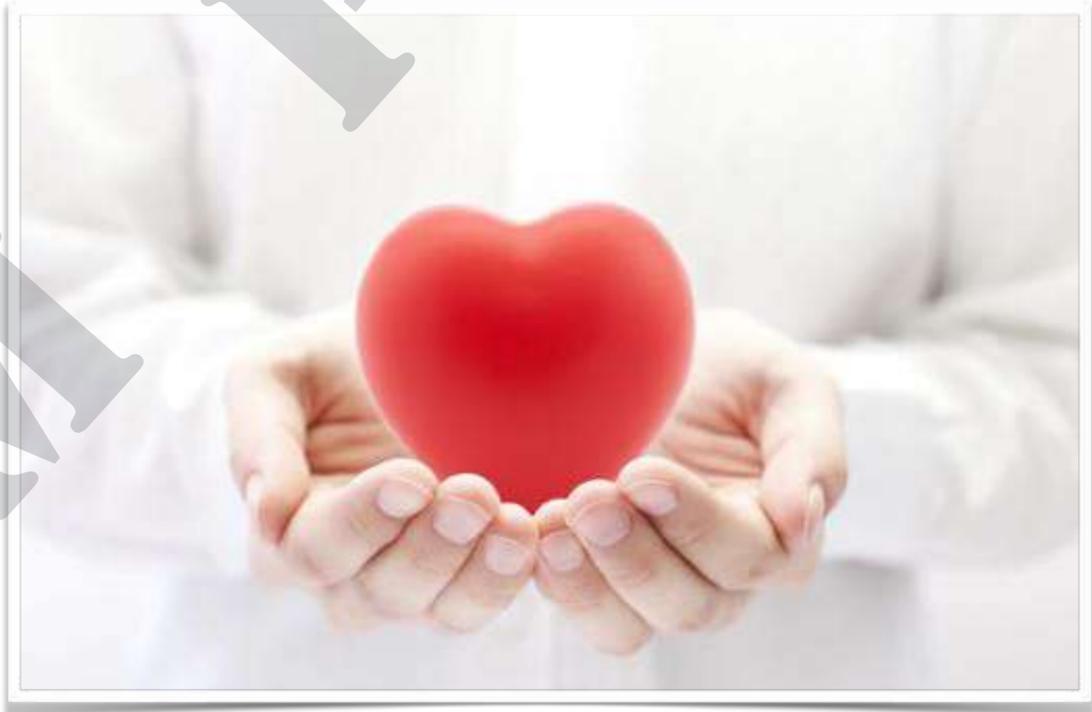


*Psyche/Neuro*

Resilience/pain threshold,  
addiction habits, memory  
(episodic/traumatic)

*Immunity and  
Heart Health*

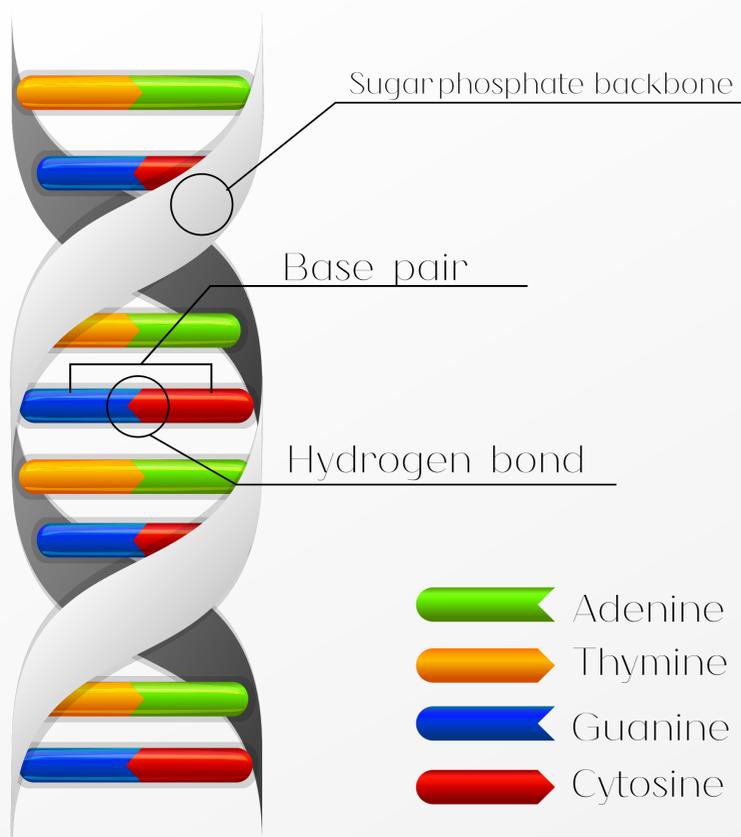
Autoimmune disease and  
cardiovascular risk, such as  
Lipid profile, sudden cardiac  
arrest, blood pressure etc.



*Disease and Lifestyle  
Risks*

Endocrine, Liver, Kidney and Gut  
health among others

## What is genetic information?



Genome is the genetic content or hereditary information of an organism, which is made up of DNA in humans and other higher organisms. **DNA is made up of four bases** Adenine, Thymine, Guanine, and Cytosine, designated by four letters **A, T, G, C**, respectively. Although the genome of all humans is almost the same, a minor difference exists among individuals. This difference, which is called **genetic variation** is responsible for **unique phenotype** (appearance, e.g., color of skin/eyes, type of hair (curly, smooth), etc.) and **difference in the health of each individual**. In most of the cases, this difference or variation is **passed on to the next generation** (inheritance), which confers disease susceptibility in the offspring.

mapmygenome.in  
Know Yourself

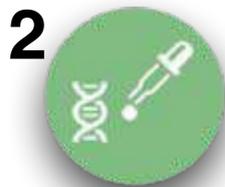
## About Mapmygenome

**Mapmygenome** is a **molecular diagnostics** company for people who wish to take a **proactive** approach towards their health. Their personal genomics products provide insights into the **genetic basis** of individual's **health**, including **traits, lifestyle, drug responses, inherited conditions, and diseases**. By combining genetic report and health history with **genetic counseling**, Mapmygenome provides **actionable steps** for individuals and their physicians towards a **healthier life**.

## What do we do with your DNA



1 You collect the saliva sample, and ship it to us in a safe environment



2 Your DNA is extracted and undergoes quality checks



3 Your DNA undergoes tests in the lab, and gets ready to be read



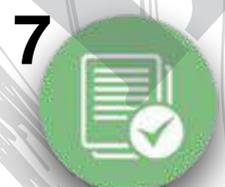
4 Your genetic sequence is subjected to extensive analysis!



5 Voila!! Your DNA has been read, and the report is ready!



6 Our brilliant genetic counsellors discuss your report with you



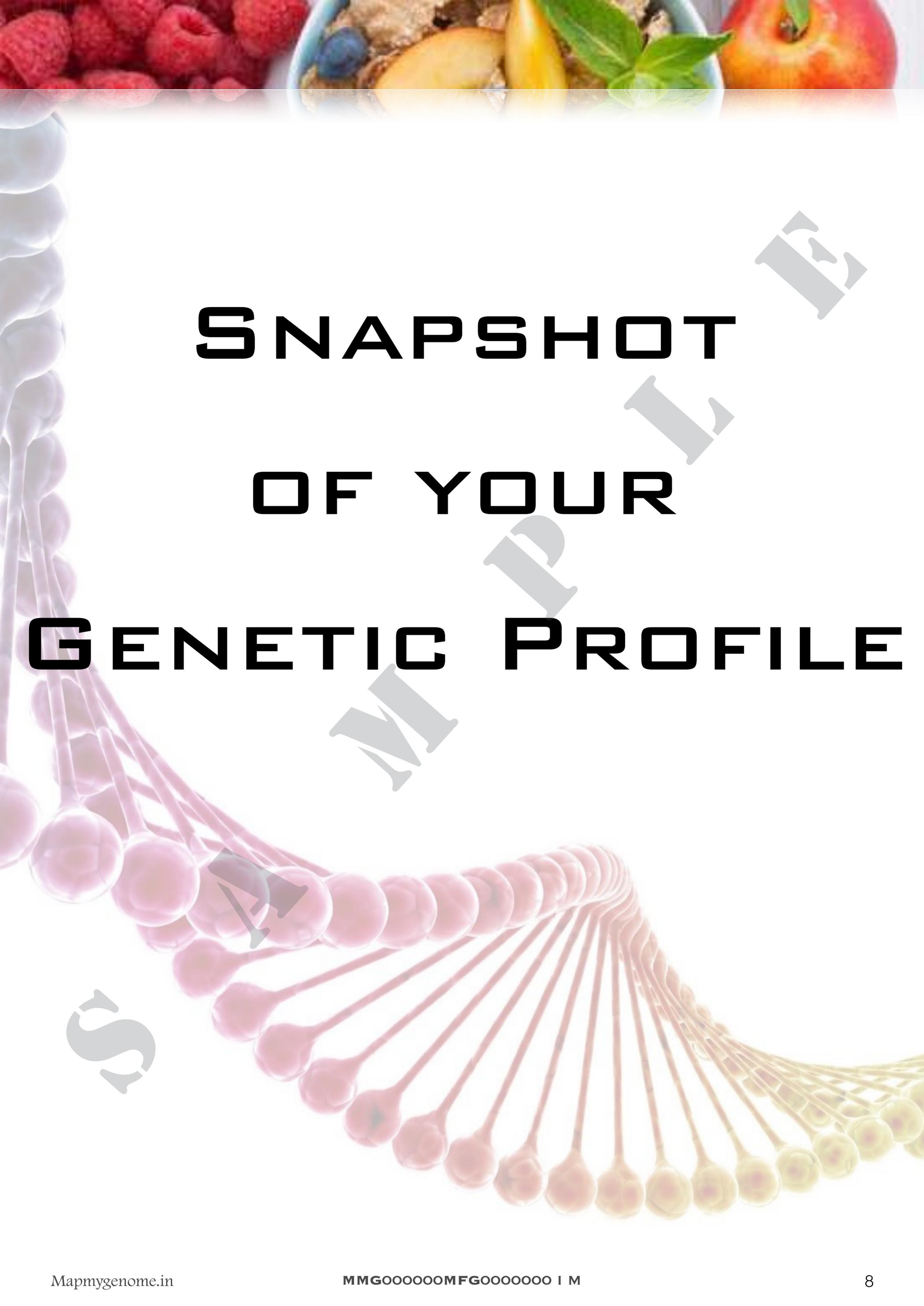
7 Finally..you get your post counselling report - your cheat code to life!

## Disclaimer

This report is only based on your genes and not on any other information you share. The report is not diagnostic in nature and should not be considered as one. What we report is your genetic predisposition towards any particular health condition. If you are reported to be on the higher risk for any of the health condition we cover, it does not mean that you have or you will contract the health condition that is mentioned and the same applies if you are reported to be on the lower risk.

When a person develops a health condition it may be due to their genetic predisposition, lifestyle, exposure to hazardous material, environmental conditions and many more factors. What we provide you should help in assessing your health status on genetic level and making the right choices for leading a healthy lifestyle and to be fit. Also this report should not be used as a reference of any kind in any selection process that is implemented in selecting a Sports person.

**GENETIC PREDISPOSITION DOES NOT MEAN PREDETERMINATION**



**SNAPSHOT**

**OF YOUR**

**GENETIC PROFILE**

# NUTRITION

| Condition                           | Inference                | Interpretation  |
|-------------------------------------|--------------------------|---|
| Gluten Intolerance                  | High genetic risk        | You have an elevated genetic risk for intolerance to gluten and gluten-containing foods.          |
| Poly Unsaturated Fatty Acids Levels | Regular                  | You do not have an elevated genetic risk for PUFA deficiency.                                     |
| Eating behaviour and Appetite       | Slightly reduced satiety | You may have slightly reduced satiety levels and hence, may be predisposed to irregular snacking. |
| BMI/Obesity                         | Medium genetic risk      | You have a slightly increased genetic risk for obesity.   |
| Response to dietary fat             | Normal                   | You do not have an increased predisposition to weight regain.                                     |
| Antioxidant levels                  | Slightly reduced         | You have a slightly increased genetic risk for oxidative stress and cellular damage.              |
| Vitamin C                           | Regular                  | You do not have an increased genetic risk for Vitamin C deficiency.                               |
| Vitamin B6                          | Reduced                  | You have an elevated genetic risk for Vitamin B6 deficiency.                                      |
| Vitamin B9                          | Regular                  | You do not have an elevated genetic risk for Vitamin B9 deficiency.                               |
| Vitamin D                           | Slightly reduced         | You have a slightly increased genetic risk for Vitamin D deficiency.                              |



# FITNESS

| Condition                       | Inference   | Interpretation  |
|---------------------------------|---|---|
| Sports/Muscle Performance       | Proportionate balance of <b>Fast- and Slow-twitch</b> muscle fibres | Equal potential for power and endurance sports performance  |
| Response to Exercise            | Slightly reduced  | You have a slightly increased likelihood for weight-loss resistance and rebound weight gain               |
| ACL Rupture                     | Slightly reduced likelihood   | You may have a slightly reduced genetic risk for sports-induced injury and ACL rupture                    |
| Disc Degeneration               | Baseline genetic risk   | You do not have an elevated genetic risk for high interleukin levels and disc degeneration                |
| Blood Pressure                  | Baseline genetic risk   | You do not have an elevated genetic risk for hypertension   |
| High Density Cholesterol levels | Slightly increased  | Great news! You're likely to have slightly increased levels of HDL ("good") cholesterol.                  |
| Low Density Cholesterol levels  | Regular   | Good news! You do not have an elevated genetic risk for higher levels of LDL ("bad") cholesterol.         |
| Blood Sugar/Insulin Sensitivity | Medium genetic risk   | You have a slightly increased genetic risk for insulin resistance which is also linked to Type 2 diabetes |
| Hypertrophic Cardiomyopathy     | Baseline genetic risk   | You do not have an elevated genetic risk for hypertrophic cardiomyopathy                                  |
| Atrial Fibrillation             | Baseline genetic risk   | You do not have an elevated genetic risk for Atrial fibrillation.   |
| Long QT Interval                | Baseline genetic risk   | You do not have an elevated genetic risk for Long (prolonged) QT interval.                                |
| Myocardial Infarction           | High genetic risk   | You have an elevated genetic risk for MI.   |
| Coronary Heart Disease          | High genetic risk   | You have an elevated genetic risk for CHD.  |
| Sudden Cardiac Arrest           | Baseline genetic risk   | You do not have an elevated genetic risk for Sudden Cardiac Arrest.                                       |
| Venous Thromboembolism          | Baseline genetic risk   | You do not have an elevated genetic risk for VTE.   |
| Stroke                          | Medium genetic risk   | You have a slightly increased genetic risk for stroke.  |
| Bone Mineral Density            | Slightly reduced  | You have a slightly increased genetic risk for low bone mineral density (osteoporosis).                   |
| Ankylosing Spondylitis          | Baseline genetic risk   | You do not have an elevated genetic risk for ankylosing spondylitis.                                      |
| Restless Leg Syndrome           | High genetic risk   | You have an elevated genetic risk for restless legs syndrome.   |

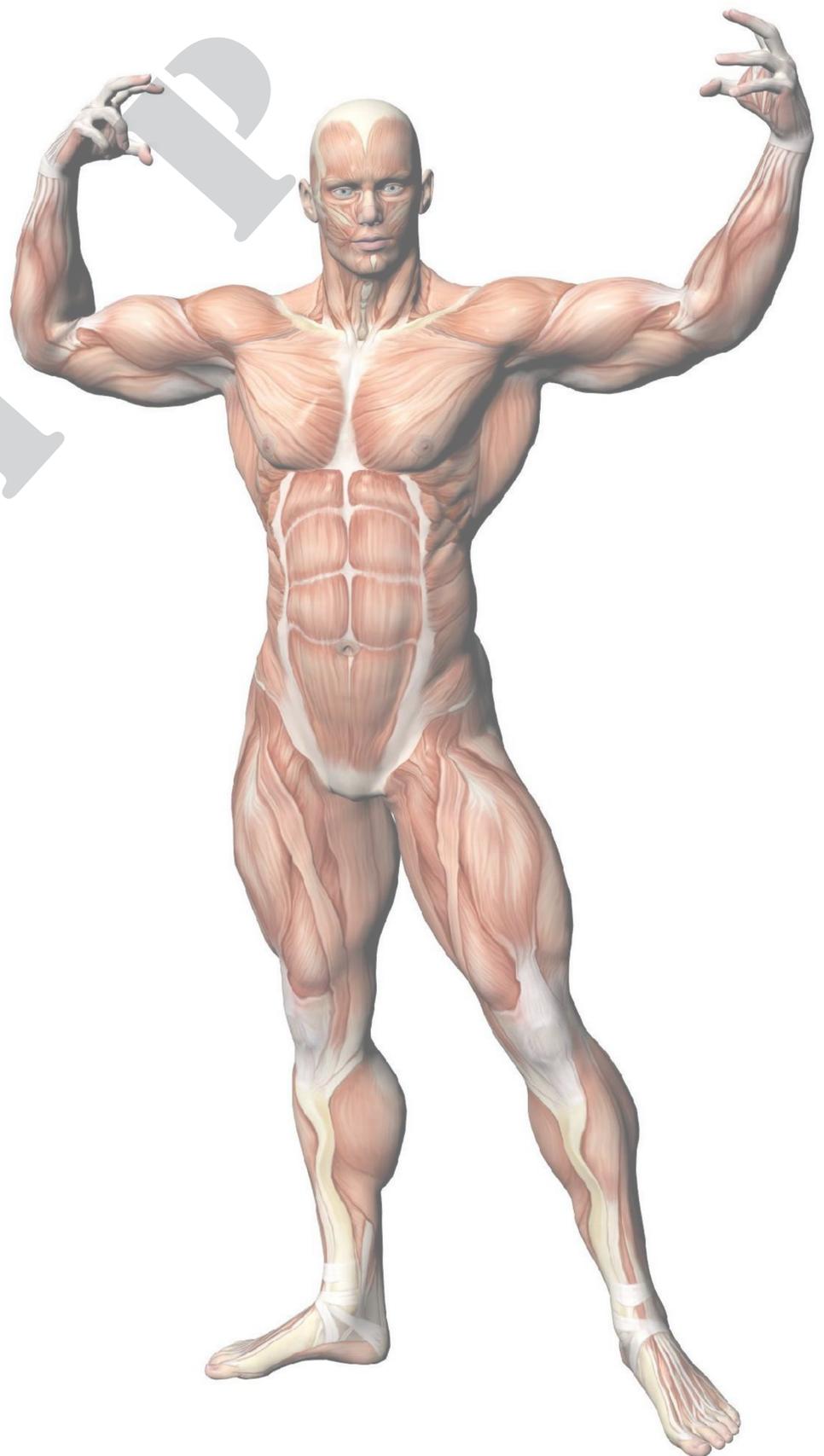
# WELLNESS

| Condition                    | Inference   | Interpretation  |
|------------------------------|---|---|
| Resilience                   | "Sensitive" Genotype - elevated levels of dopamine. | Increased sensitivity to pain<br>Better memory and attention span<br>Increased empathy towards others |
| Learning capacity            | Slightly reduced                                    | Uh-oh! You have a slightly reduced tendency to learn from, and avoid errors                           |
| Anxiety and eating disorders | Baseline genetic risk                               | Yay! Not only do you have a good memory, you're also not at risk for anxiety and eating disorders.    |
| Inflammation                 | High genetic risk                                   | You have an elevated genetic risk for chronic inflammation and autoimmune disease.                    |
| Caffeine Consumption         | Regular   | You are genetically predisposed to typical levels of caffeine consumption                             |
| Addiction to Alcohol         | Baseline genetic risk                               | You do not have an elevated genetic risk for addiction to alcohol.                                    |
| Migraine                     | Baseline genetic risk                               | You do not have an elevated genetic risk for migraine.  |
| Nicotine Dependence          | Medium genetic risk                                 | You have a slightly increased genetic risk for nicotine addiction.                                    |
| Hypothyroidism               | Baseline genetic risk                               | You do not have an elevated genetic risk for hypothyroidism.  |
| Chronic Kidney Disease       | Baseline genetic risk                               | You do not have an elevated genetic risk for chronic kidney disease.                                  |
| Liver Cirrhosis              | Baseline genetic risk                               | You do not have an elevated genetic risk for liver cirrhosis.   |
| PSA Levels                   | Baseline genetic risk                               | You are likely to have typical PSA levels.  |





# AREAS NEEDING YOUR ATTENTION





## Cardiorespiratory Fitness

- You have a slightly increased risk for **reduced satiety**
- You have a slightly increased risk for **Insulin resistance**
- You have an elevated risk for **Myocardial Infarction**
- You have an elevated risk for **Coronary heart disease**
- You have a slightly increased risk for **Stroke**
- You have a slightly increased risk for **obesity**
- You have a slightly increased risk for **nicotine dependence**



## Muscle Strength and Endurance

**Equal Potential for power and endurance sports performance**

You have a slightly increased risk for **weight-loss resistance**



## Body Composition

- You have an elevated risk for **vitamin B6 deficiency**
- You have a slightly increased risk for **reduced bone mineral density**
- You have a slightly increased risk for **Vitamin D deficiency**
- You have a slightly increased risk for **oxidative stress and cellular damage**



## Neurological/Psyche components

**Sensitive** personality - Elevated levels of dopamine!  
You have slightly reduced **avoidance of errors**



## Clinical Parameters

- You have an elevated risk for **restless legs syndrome**
- You have an elevated risk for **inflammation and autoimmune disorder**
- You have an elevated risk for **gluten intolerance**



## Injury risk and Recovery

An athlete's risk of injury is affected by multiple factors - bone health, muscle repair and nutrient levels. Recovery from sports injuries is dependant on biological events such as cellular repair and regeneration, neutralisation of free radicals (immunity), bone mineralisation etc.

- You have a slightly increased risk for **oxidative stress and cellular damage**
- You have a slightly increased risk for **low bone mineral density (osteoporosis)**
- You do not have an elevated risk for reduced Vitamin C levels.
- You have a slightly increased risk for **Vitamin D deficiency**
- You have a slightly reduced likelihood for sports-induced injury and ACL rupture
- You do not have an elevated risk for high interleukin levels and disc degeneration



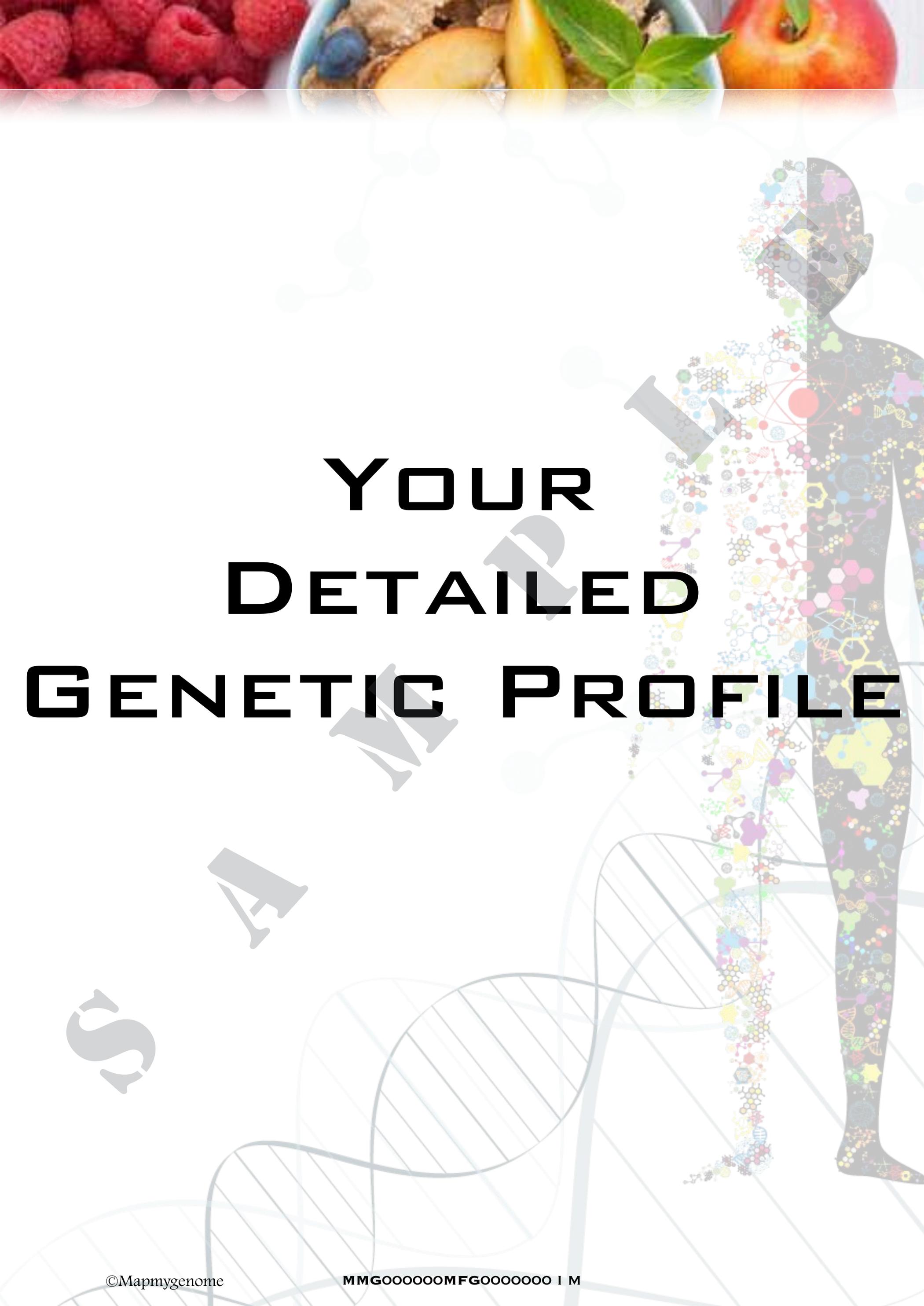
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**Transformation is not a  
future event.  
It is a present activity**

A

S



# YOUR DETAILED GENETIC PROFILE



# Understanding your Genetic Report

## "DECODING YOUR GENE-UINE POTENTIAL"

We checked for the presence of single-letter variations in the DNA alphabet which determine the genetic component of health conditions. Your final profile displays your predisposition towards having average risk (equivalent to the population) or higher, based on your genetic code.

The American College of Sports Medicine (ACSM), Dieticians of Canada, American Fitness Association of America (AFAA) and other groups have set guidelines for management of athletes' diet, physical training and medical conditions. Those at slightly high or high risk for a certain condition need to be closely monitored for early manifestation of symptoms and warning signs - eg., a drastic drop in lowered energy levels, or a serious manifestation (eg., severe breathlessness or heart-related issues), etc., This can help athletes detect potential complications and delay onset or in most cases, avoid them completely (through nutrition/wellness counseling).

The goal of every athlete is to improve his/her performance. Certain factors like family history, lifestyle and dietary habits, exposure to extreme physical/mental stress and .... genetics determine athletic prowess. Knowing how genes work to influence physiological processes can be an effective supplemental procedure in pre-participation programmes in sports academies.

## Ah! So that's what it means!

|  |   |   |  |
|--|---|---|--|
|  <p><b>Baseline Risk</b></p> <p>Your genetic risk is the same as the general population</p> |  <p><b>Slightly Increased Risk</b></p> <p>Your genetic risk is slightly higher than the population average</p> |  <p><b>High Risk!</b></p> <p>Your genetic risk is considerably higher than the population average.</p> | <p><b>WHY IS IT RELEVANT?</b></p> <p><i>This box will tell you the association of the condition in question with your athletic or sporting prowess</i></p> |
|--|---|---|--|

## PLAN OF ACTION

This box contains some actionable steps you can take to mitigate your genetic risk for the condition in question.

*Psst - this box contains information that your genetic counsellor wants to share with you!*

# IMPORTANCE OF SPORTS GENOMICS

## An Athlete's Life Cycle

Dietary patterns, metabolism, muscle and bone composition, nutrient levels and immunity are core components of any athlete's well-being. Genes perform important functions related to many such processes in the body. An overall assessment of an athlete's innate health requires a closer look at these biological mechanisms.

# NUTRITION

## Gluten Intolerance

High genetic risk for intolerance to gluten

### WHY IS IT RELEVANT?

**Celiac disease** (a.k.a gluten intolerance) is caused by autoimmune response (destruction of the body's own cells), triggered by gluten and gluten-containing foods. **An athlete's diet** comprises of **carbohydrates** which might include gluten-containing grains like wheat. If one has a genetic risk for developing this condition, a **high-gluten diet may trigger the disease** - leading to adverse reactions such as abdominal pain, diarrhoea, unhealthy weight loss and **malnutrition** (to name a few)

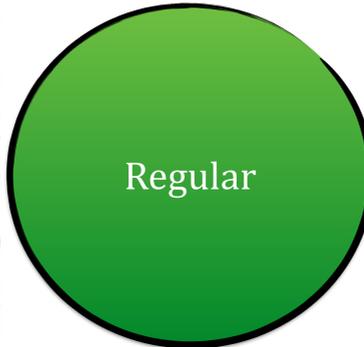
### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Poly Unsaturated Fatty Acids (PUFA) Levels

### WHY IS IT RELEVANT?

Omega-3 and Omega-6 act as **protective entities** against **inflammation** (a common concern in athletes/players), **muscle soreness and fatigue**. Adequate levels of these PUFAs is important for **regulating immune response, muscle maintenance and recovery**.



### PLAN OF ACTION

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## Eating behaviour and appetite

### WHY IS IT RELEVANT?

Athletes require nutrient-dense foods which keep their energy levels up and help them undergo rigorous training schedules. Dietary composition may vary between athletes in different sports (carbohydrate/fat/protein ratio). However, individual metabolic requirements depend on a fine balance between **"hunger pangs"** and **"satiety levels"**.



### PLAN OF ACTION

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## BMI/Obesity

### WHY IS IT RELEVANT?

BMI is purely a measure of weight (adjusted by height) and differs between various athletic groups. The genotype of an athlete helps assess their innate **predisposition to weigh more/less** (high/low BMI), **calorific intake** and **neural** ("brain") **response** to food.

Medium genetic risk for obesity.

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Response to dietary fats

### PLAN OF ACTION

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Normal

### WHY IS IT RELEVANT?

The body's response to dietary fat ("sensitivity") is an important factor in **weight management**. There is a strong gene-environment link affecting insulin function and **fat mobilization**, which is essential for **energy utilization** in the **skeletal muscle**. Careful monitoring of diet is required for optimal **weight-to-strength ratio** in professional athletes.

## Antioxidant levels

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

Slightly reduced

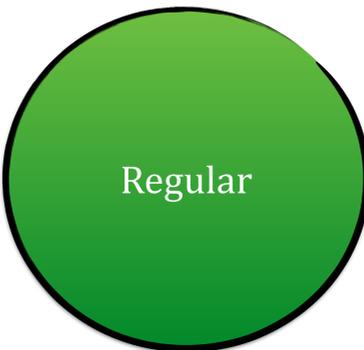
### WHY IS IT RELEVANT?

Antioxidants are a **defense mechanism** against **oxidative stress** and **cellular damage**. The production of free radicals is elevated during and post-exercise. **Detoxification** is important for maintaining overall health and **fitness**, especially for athletes.

## Vitamin C Levels

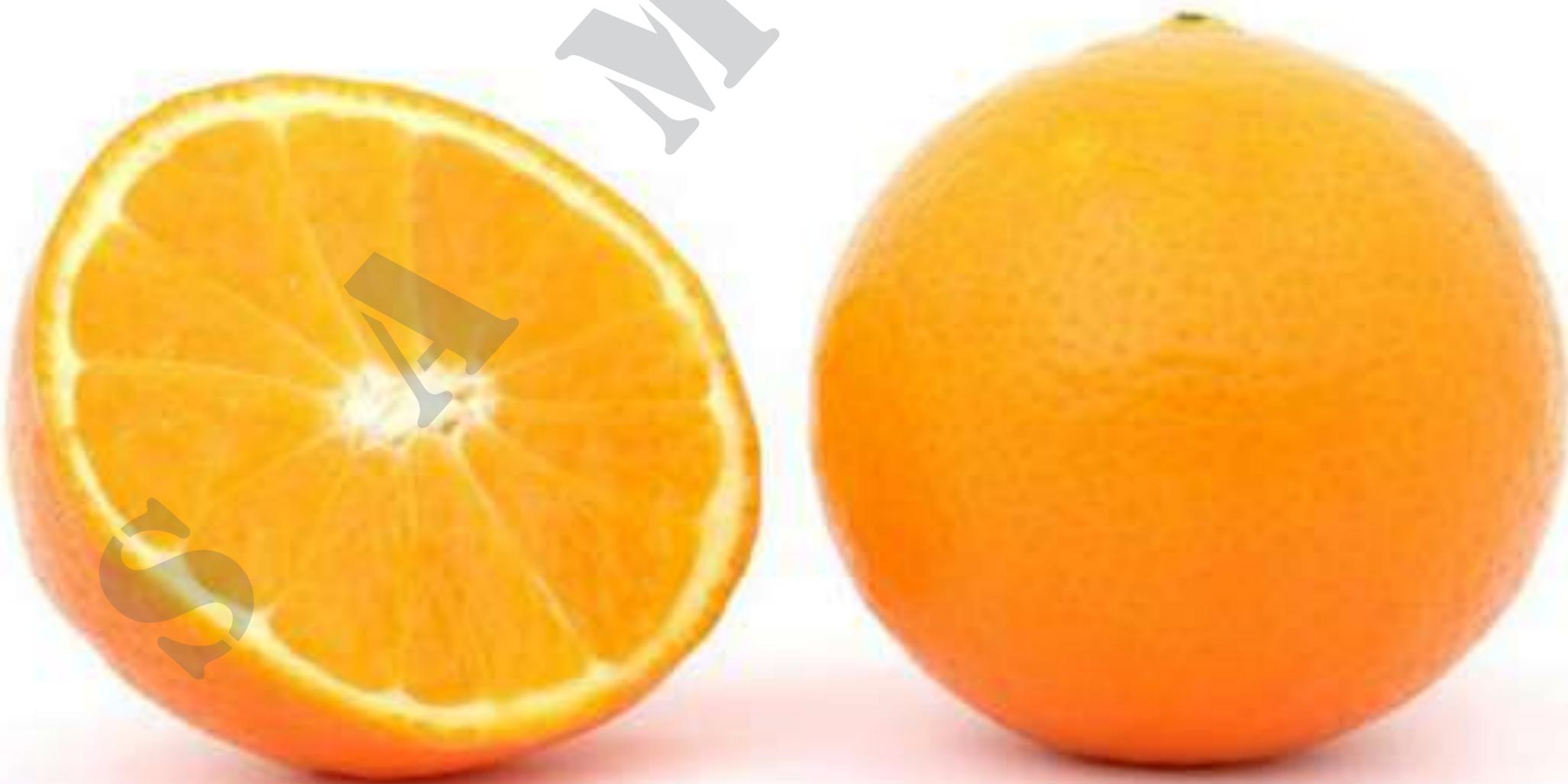
### WHY IS IT RELEVANT?

A well-known function of Vitamin C is its **immune shield** to the “common cold” and other ailments such as allergies. Since athletes are required to be **physically fit** without compromising energy levels, **adequate levels of Vitamin C must be maintained**. This vitamin is also a key catalyst for bone, teeth and skin wellness, due to its **regenerative power** (eg., collagen synthesis and tissue/wound repair) - leading to **faster injury recovery**.



### PLAN OF ACTION

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## Vitamin B Levels

### WHY IS IT RELEVANT?

The B complex vitamins (especially Vitamin B6, B9 and B12) are **vital** micronutrients for **immunity** and **cellular repair**. According to the International Journal of Sport Nutrition and Exercise Metabolism, regular intake of these compounds through a balanced diet **improves athletic performance**, **reduces recovery time** and **helps avoid burn-outs**, during high-intensity training. Vitamin B6 and B9 cannot be synthesized by our body and need to be supplied through a well-balanced diet.



### PLAN OF ACTION

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### PLAN OF ACTION

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## Vitamin D Levels

### WHY IS IT RELEVANT?

Sports nutrition experts universally agree that **inadequate levels** of Vitamin D can seriously **impair performance** in athletes. Overtraining can also lead to **de-mineralization** (loss of minerals from the bone). Lower BMD is also a warning sign for **osteoporosis**. **Post-exercise recovery, risk for fractures, increased power** and force during high-intensity sports are some of the key aspects which heavily rely on Vitamin D and bone mineral density. Studies show that endurance athletes have lower BMD than other athletic groups. Those with a **genetic risk** for lower Vitamin D levels or low BMD must be regularly monitored and prescribed supplementation/diet plan, if clinically confirmed.

Slightly reduced

### PLAN OF ACTION

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# FITNESS



## Sports/Muscle Performance

Proportionate balance of Fast- and Slow-twitch muscle fibres

### WHY IS IT RELEVANT?

Be it muscular power or endurance, the innate composition of the skeletal muscle fibers is the main biological factor which affects **athletic outcome**. Informed decisions (based on the genotype) and customised training for **speed and endurance players** can help improve athletic performance.

### PLAN OF ACTION

*\*You have equal potential for power and endurance sports performance\**

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## ACL Rupture

### WHY IS IT RELEVANT?

Anterior Cruciate Ligament (ACL) rupture is one of the **most common sports injuries**. Female athletes are at a 4-6 fold greater risk than their male counterparts. Most of the ACL rupture incidents (~70%) have been reported to have occurred via non-contact mechanisms. Apart from family history and neuromuscular issues, **genetic susceptibility** can elevate an athlete's risk for sports injuries. Genetic variation can cause **increased inflammation** or can hamper the body's mechanism of **tissue repair and recovery**. Pre-participation screening for potential risk helps sports physicians and coaches monitor their athletes better and engage them in an effective **injury-prevention program**.

Slightly reduced  
likelihood

### PLAN OF ACTION

*This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly..*

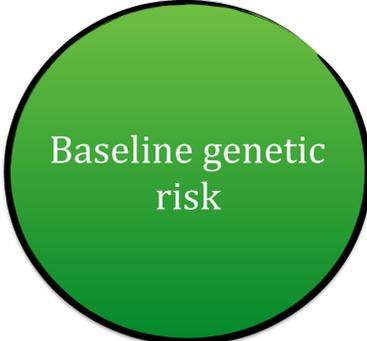




## Disc Degeneration

### WHY IS IT RELEVANT?

Disc degeneration is a complex condition which can be triggered by genetic and non-genetic factors. Mechanical stress and physical overloading is one of the risk factors for disc degeneration in athletes. Pre-participation screening for potential risk helps sports physicians and coaches monitor their athletes better and engage them in an effective injury-prevention program.



### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Bone Mineral Density

### WHY IS IT RELEVANT?

Sports nutrition experts universally agree that **inadequate levels** of Vitamin D can seriously **impair performance** in athletes. Overtraining can also lead to **de-mineralization** (loss of minerals from the bone). Lower BMD is also a warning sign for **osteoporosis**. **Post-exercise recovery, risk for fractures, increased power** and force during high-intensity sports are some of the key aspects which heavily rely on Vitamin D and bone mineral density. Studies show that endurance athletes have lower BMD than other athletic groups. Those with a **genetic risk** for lower Vitamin D levels or low BMD must be regularly monitored and prescribed supplementation/diet plan, if clinically confirmed.



### PLAN OF ACTION

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## Blood Pressure

### WHY IS IT RELEVANT?

Typically, athletes have a lower prevalence rate of **hypertension** because of regular training and exercise lowers blood pressure. However, certain groups (for eg., **high-intensity water sports**) have been found to display **elevated blood pressure levels** - leading to **increased risk for renal dysfunction, heart health concerns** etc. Static exercises (against resistance) can increase diastolic blood pressure. Dynamic and endurance exercises can increase systolic blood pressure. **Family history of hypertension is also a risk factor** for athletes. Detection of genetic risk can be used as a means of **early intervention**.

Baseline genetic risk for hypertension (high blood pressure)

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Cholesterol Levels

### WHY IS IT RELEVANT?

HDL-c (good cholesterol) and LDL-c (bad cholesterol) levels determine the lipid profile and **cardiovascular health** of athletes. Lower levels of HDL-c and higher levels of LDL-c can **increase the risk of heart disease** in athletes. Moderate-intensity aerobic exercise is recommended for lowering cardiometabolic risk.

### HDL-c Levels

Slightly increased

### LDL-c Levels

Regular

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

# Blood Sugar/Insulin Sensitivity

## WHY IS IT RELEVANT?

Blood sugar (glucose) is a very important indicator for **metabolic health**, even in athletes. Optimization of **glucose levels** (and thereby insulin function) is essential for **athletic outcome**. Maintenance of glucose levels via insulin-glucagon regulation is affected by meal timing, sleep quality, external environment, level of training and caloric consumption. An athlete's main requirement is the **maintenance of energy levels** during play. Screening for potential risk of insulin resistance/diabetes can help in better management and targeted improvement.

Medium genetic risk

## PLAN OF ACTION

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# Cardiac Arrhythmia

## Atrial Fibrillation

### WHY IS IT RELEVANT?

Extreme sports and prolonged participation in **high-intensity physical activity** can **elevate risk** for cardiac arrhythmias (**irregular heartbeat**) like Atrial Fibrillation. This phenomenon is commonly called "**flutter**" and has a significant prevalence in younger adults.

Baseline genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype.

## QT Interval

### WHY IS IT RELEVANT?

Electrocardiographic traits such as QT interval need to be monitored during all the screening procedures for athletes. Most of the studies show that there is an **elevated risk for cardiovascular complications** (such as Long QT Syndrome or LQTS) which can cause **sudden death** (even if they are asymptomatic i.e, little or no symptoms). Identification of athletes with high genetic risk can help implement regular check ups and reduce the chances of clinical manifestation.

Baseline genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype.



## General Heart Health

### WHY IS IT RELEVANT?

Coronary Heart Disease and Myocardial Infarction are the leading causes of exercise-related sudden death . Regular exercise and physical training keeps athletes fit and healthy. However, some studies show that a prolonged participation in “**extreme**” sport (especially endurance and long-distance) can bring about a structural change in cardiac features, such as ventricular ejection fraction. Identification of athletes with **high genetic risk** can help implement regular check ups and reduce the chances of clinical manifestation. A result of cardiac remodelling, hypertrophic cardiomyopathy is pinned as the **number one reason for cardiac anomalies in athletes**. This can vary in severity, from being mildly symptomatic to a fatal event - such as an **athlete’s unexpected collapse on the field**.

### Myocardial Infarction

### Coronary Heart Disease



### Hypertrophic Cardiomyopathy



### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Sudden Cardiac Arrest

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype.

Baseline genetic risk

### WHY IS IT RELEVANT?

These are the common causes of sudden death in young athletes, An alarming percentage of these incidents in sports history have been traced back to these medical conditions. Ironically, potential risk can go completely undetected in childhood, if asymptomatic (manifestation can happen at a later age).

Sudden cardiac arrest is a grave condition wherein symptoms manifest as late as <1 hour before death. Although a rare event, regular screening and ECG monitoring is essential to identify athletes at risk for this serious condition. Identification of athletes with high genetic risk can help implement regular check ups and reduce the chances of clinical manifestation.

## Stroke

### WHY IS IT RELEVANT?

**Physical and mental trauma** - these are two leading causes of Stroke. A major **concussion** or a near-lethal injury on the field can lead to grave complications and in some cases, the **end of an athlete's career**, if not managed well. Risk factors include family history, **extreme/collision sports**, pre-existing cardiac issues and **genetic predisposition**.

Medium genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype.

## Venous Thromboembolism

### WHY IS IT RELEVANT?

Venous Thromboembolism (VTE) is a late-onset condition which causes blood clots to form (due to the absence of anticoagulant), especially in the legs. One of the risk factors for VTE (apart from family history and genetic mutation) is a sedentary lifestyle. Athletes typically are at a low risk for thrombosis. However, preparticipation screening (of athletes) for risk factors is recommended for better management and monitoring.

Baseline genetic risk

### PLAN OF ACTION

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# Ankylosing Spondylitis

## WHY IS IT RELEVANT?

Ankylosing spondylitis is an **inflammatory** disease (ankylos= crooked; spondylos=vertebra) which affects the joints and can lead to **altered spinal curvature**. This is an autoimmune condition and can present itself in very young individuals with symptoms similar to **muscular pain** (and hence go undiagnosed). Early detection can help alleviate symptoms, **faster recovery and improves performance**.

Baseline genetic risk

## PLAN OF ACTION

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## Restless Legs Syndrome

### WHY IS IT RELEVANT?

Individuals affected with RLS describe symptoms as **nocturnal muscle cramps** and irresistible **urge to start walking** due to an annoying “creepy-crawly” sensation in their legs. Athletes (especially endurance athletes) who have **low Ferritin (iron) levels are at risk for RLS**. A high-risk individual can be monitored for regular sleeping habits and overall awareness to help identify symptoms. The issues of **adequate dietary iron intake** must be addressed, after checking for possible deficiency. Reduced intake of alcohol and caffeine helps alleviate symptoms (if medication alone does not suffice).

High genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Response to Exercise

### WHY IS IT RELEVANT?

**Weight management** is a key component of every fitness regime. Inter-individual variation in the ability to benefit from exercise-induced weight loss *and* maintain healthy weight, post-weight-loss, can be attributed to genetic factors. One’s DNA sequence can alter response to exercise and the **rate of lipolysis** (fat tissue breakdown). Individuals who might be “genetically” prone to being **weight loss resistant**, may also eventually regain weight previously lost, **Fitness regimes need to be structured** to overcome such hurdles and accelerate fat loss. Training variables such as frequency and intensity need to be modified, to provide optimal benefits. This can be done by monitoring progress more closely, to identify the best-suited training plan.

Slightly reduced

### PLAN OF ACTION

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# WELLNESS

## Personality

### WHY IS IT RELEVANT?

Sports players are subject to rigorous training, constant supervision and continuous evaluation of their athletic prowess. To stay on top of their game, players need to be conditioned such that a **healthy balance of competitive spirit and pressure** keeps them in form. They also battle considerable **stress, anxiety** and in some cases, **physical/mental trauma**. Those who are more **emotionally vulnerable** require **strong guidance and support** from their mentor/coach. **Early identification of vulnerability** can help manage them better.

## Resilience

### "Sensitive"

- Increased sensitivity to pain
- Better memory and attention span
- Increased empathy towards others

## Learning capacity

## Anxiety and eating disorders

Slightly reduced

Baseline genetic risk

*Whoops!! Looks like you are lacking slightly at feedback based learning, and are thus more likely to repeat errors*

*Brilliant!! Seems like you have good memory, and you don't have an elevated genetic risk for anxiety and eating disorders!*

“Your ability to get better with practice is genetic”

## Chronic Kidney Disease

### WHY IS IT RELEVANT?

In athletes, **risk factors** for kidney disease include **high blood pressure**, kidney trauma (due to collision sports) and extremely high protein in diet. The general recommendation for protein intake in healthy individuals is 1 g of protein per kg body weight and higher for athletes. However, **very high protein intake (>2 g protein/kg body weight)** can be a risk factor for **renal dysfunction**. Athletes who are at an elevated risk for kidney disease must be monitored for their protein intake.

Baseline genetic risk

You do not have an elevated risk for chronic kidney disease.



Regular

## Caffeine consumption

You are genetically predisposed to typical levels of caffeine consumption

### WHY IS IT RELEVANT?

Caffeine acts as a nervous stimulant and **stimulates "adrenaline rush"**. Some studies show that caffeine intake **enhances endurance** performance by increasing fat utilization by muscle, thus reserving glycogen stores. The longer the duration of the sporting event, the higher is the fuel requirement of the athlete. Effects on caffeine intake on sprinting (and anaerobic respiration) are still unclear and need further validation. **Excess intake** of caffeine can adversely affect sports performance - **loss of focus/coordination, sleep and gastrointestinal trouble**. Extremely high intake of caffeine can increase **risk for cardiac arrhythmias** (irregular heartbeat).

## Addiction to alcohol

### WHY IS IT RELEVANT?

The effect of alcohol on athletic performance depends on the amount of alcohol consumed. Studies show that low to medium levels of alcohol intake might **ruin perfect hand-eye coordination** and **motor skills**. Chronic abuse of alcohol (and intoxication) causes a severe dent in athletic performance. This is because alcoholism **increases the risk for liver damage, cardiovascular disease, nutrient deprivation and psychological imbalance**.

Baseline genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Migraine

Baseline genetic risk

### WHY IS IT RELEVANT?

**High-altitude sports** (such as skiing and mountaineering) **increase the risk** for a migraine attack, especially in athletes with a **genetic risk** and/or athletes subjected to high levels of physical exertion over long periods of time. Incidents of trauma (eg., concussions during collision sports) are also major risk factors for migraine. Early detection of potential risk-groups helps coaches condition their athletes better. Awareness about early symptoms and do's/dont's can also help athletes delay (or completely avoid) migraine episodes.

### PLAN OF ACTION

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## Nicotine Dependence

### WHY IS IT RELEVANT?

Smoking behaviour directly affects sports performance - an athlete's **VO2max and lung capacity decreases** with nicotine use. Studies show that sportsmen who were nicotine users displayed a **reduced aerobic capacity** (especially high-intensity aerobic exercise), when compared to non-users. **Predisposition to smoking addiction** can be detected by analyzing the genes responsible for the brain's response to such stimuli.

Medium genetic risk

### PLAN OF ACTION

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## Hypothyroidism

### WHY IS IT RELEVANT?

The link between thyroid levels and athletic profile has been investigated in multiple studies. **Endurance athletes** might be at a **greater risk for hypothyroidism** (low thyroid hormone) **due to intense training**, leading to **metabolic disregulation** and subsequent weight fluctuation.

Baseline genetic risk

You do not have an elevated genetic risk for hypothyroidism.

## Inflammation

### WHY IS IT RELEVANT?

Inflammation is a biological event that peaks during the body's immune response - antibodies, immune cells (eg., cytokines) are produced in response to foreign invasion or stressful conditions. It is important that fitness coaches understand the mechanism of **inflammation** as it varies in different intensities of training regimes. Typically, in healthy individuals, exercise helps reduce "flaring" and **immune reactivity**. However, some studies showed that exercise-induced inflammation is a common concern among athletes. When high-intensity training triggers chronic inflammation, the **muscle groups take longer to recover (and get repaired)**.

High genetic risk

### PLAN OF ACTION

This box contains primary recommendations for you based on your genotype. During your counselling session, your health coach will take your lifestyle, diet, and clinical conditions (if any) into account - based on which this may change, albeit slightly.

## Liver Cirrhosis

### WHY IS IT RELEVANT?

Liver disease can severely hamper sports performance. Athletes with liver disease experience **reduced exercise performance** - resting **cardiac output** will be higher than usual. Family history, alcohol abuse, previous infection of the liver (eg., hepatitis) and autoimmune disease are all important risk factors for liver cirrhosis, apart from genetics.

Baseline genetic risk

You do not have an elevated risk for liver cirrhosis.

## PSA Levels

### WHY IS IT RELEVANT?

Prostate Specific Antigen (PSA) is a protein which is produced by the prostate gland, in males. Elevated levels for PSA is a risk marker for prostatitis prostate cancer. Athletes who are on testosterone replacement therapy are also at increased risk and must be monitored regularly.

Baseline genetic risk

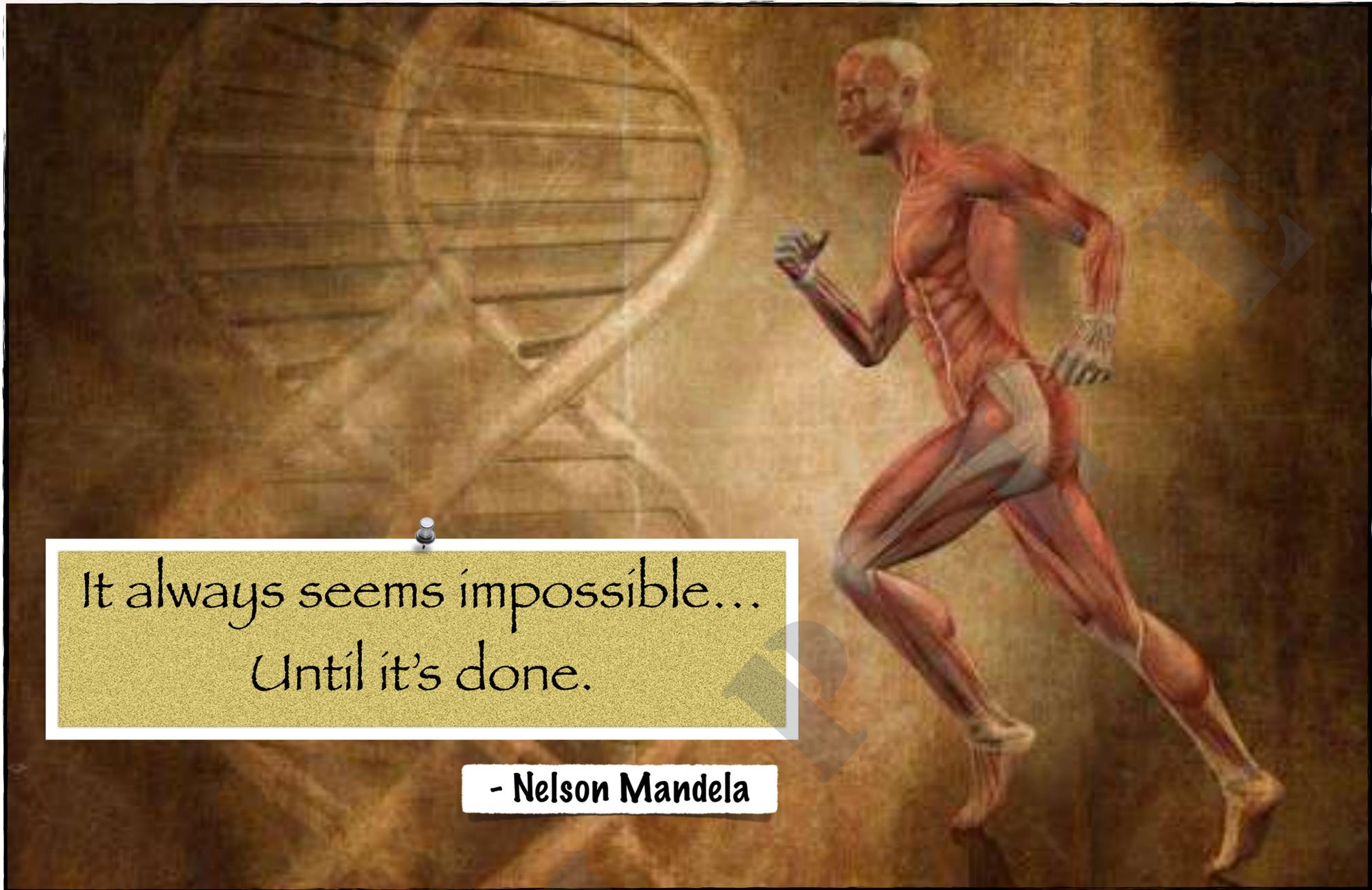
You are likely to have typical PSA levels



Any questions for your genetic counselor?

SA M P





It always seems impossible...  
Until it's done.

- Nelson Mandela



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