



# Weight and Fitness management

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Dear ...,

Your genes have been successfully analyzed and this report contains straightforward information about your body's response to nutrition and physical activity. You will find valuable information about your personal relation with fats, carbohydrates, vitamins and minerals, which will guide you to optimize your diet according to what your unique body needs. This report is also a fundamental tool for physical training, whether you are an amateur or a professional athlete. It reveals what type of exercise is best for you and how you can improve muscle regeneration, lower your heart rate, avoid injuries, etc.

We remind you that any changes you want to make in your diet or health treatment should be discussed with a health professional. The information provided in this report is valid only for research, information and educational use. It is not valid for clinical or diagnostic purpose.

In the first pages you will find a summary of the analyzed subjects and results, which are discussed with more detail in later pages. At the end is a summary of recommendations for your weight and fitness management. The iconic meters next to each topic indicate whether your genes are beneficial (green) or unfavorable (red) for your health.

## NUTRITION AND WEIGHT MANAGEMENT SUMMARY

MEDITERRANEAN DIET (red = not beneficial, green = very beneficial for your health)



OMEGA 3 AND OMEGA 6 (red = risk of deficit)



FAT CONSUMPTION (red = too much consumption)



VEGETABLES CONSUMPTION (red = not enough consumption)



INTAKE OF CARBOHYDRATES (red = too much consumption)



VITAMIN B2 (red = risk of deficit)



VITAMIN B6 (red = risk of deficit)



VITAMIN B<sub>12</sub> (red = risk of deficit)



VITAMIN C (red = risk of deficit)



VITAMIN E (red = risk of deficit)



VITAMIN K (red = risk of deficit)



VITAMIN B<sub>9</sub> (red = risk of deficit)



VITAMIN D (red = risk of deficit)



CALCIUM (red = risk of deficit)



IRON (red = risk of deficit)



LDL CHOLESTEROL (red = risk of high levels)



HDL CHOLESTEROL (red = risk of low levels)



TRIGLYCERIDES (red = risk of high levels)



BITTER TASTE (red = extra sensitive to bitter)



PECKING (red = increased tendency)



SWEET TOOTH (red = increased tendency)



CAFFEINE (red = extra sensitive)



OVERWEIGHT (red = higher predisposition)



EATING DESIRE (red = increased desire to eat)



FEELING OF SATIETY (red = less satiable)



EMOTIONAL EATING (red = more reactive to emotions)



DIFFICULTY LOSING WEIGHT (red = more difficult)



MEDITERRANEAN DIET (red = not effective to lose weight, green = very effective)



LOW FAT DIET (red = not effective to lose weight, green = very effective)



RESPONSE TO MONO-UNSATURATED FATS (red = not responsive, green = very responsive to lose weight)



LOW CARB DIET (red = not effective, green = very effective to lose weight)



## *SPORTS AND FITNESS MANAGEMENT SUMMARY*

POWER (red = low, green = high power)



RESISTANCE (red = low, green = high resistance)



AEROBIC CAPACITY (red = low, green = high capacity)



STRENGTH (red = low, green = high strength)



CARDIO AND PULMONARY CAPACITY (red = low, green = high capacity)



RESILIENCE (red = low, green = high resilience)



MUSCULAR STRENGTH (red = low, green = high muscular strength)



MUSCLE RESPONSE TO RESISTANCE TRAINING (red = low response, green = high response)



SKELETAL MUSCLE PERFORMANCE (red = low, green = high performance)



MUSCULAR FATIGUE (red = quick, green = slow fatigue)



MUSCLE REGENERATION CAPACITY (red = slow, green = fast capacity)



GLOBAL BENEFIT OF SPORT (red = low, green = high benefit)



BENEFIT OF EXERCISE ON INSULIN SENSITIVITY (red = low, green = high benefit)



BENEFIT OR EXERCISE ON CHOLESTEROL (red = low, green = high benefit)



BENEFIT OF EXERCISE ON BODY MASS INDEX (red = low, green = high benefit)



METABOLIC EFFICIENCY (red = low, green = high benefit)



GENERAL RISK OF INJURY (red = high, green = low risk)



RISK OF INJURY TO JOINTS (red = high, green = low risk)



RISK OF OVERLOAD FRACTURE (red = high, green = low risk)



RISK OF RUPTURED TENDONS AND LIGAMENTS (red = high, green = low risk)



ABILITY TO REDUCE HEART RATE (red = low, green = high ability)



RESPONSE OF BLOOD PRESSURE TO SPORTS (red = low, green = high response)



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## *NUTRITION AND YOUR HEALTH*

### Health benefits from a Mediterranean Diet

The health benefits of the Mediterranean diet are widely known. It is rich in monounsaturated fats, high in HDL (good) cholesterol and low in (bad) LDL cholesterol that can accumulate in the arteries. This diet is associated with increased longevity, reduced risk of cardiovascular disease and delayed cognitive impairment. Apart from reducing cardiovascular risk mortality, it is also related to a reduced incidence of cancer, Parkinson disease and Alzheimer's. Women who supplement their Mediterranean diet with virgin olive oil and walnuts may reduce their risk of breast cancer.

Certain genetic variations have been associated with an increased benefit when following a Mediterranean diet.

GENES ANALYZED: PPARG



The Mediterranean diet affects you just as well as the general population.

## Omega 3 and Omega 6 deficiency

Omega-3s (EPA and DHA) and omega-6 (AA) are essential fatty acids that must be obtained through diet. They lower blood pressure and heart rate, improve blood vessel function, reduce triglycerides and inflammation, and are good for eyesight and skin. Along with omega-3 fats, omega-6 fatty acids play a crucial role in brain function and normal growth and development. Omega-6 also helps stimulate hair and skin growth, maintain bone health, regulate metabolism, and maintain the reproductive system.

A healthy diet should provide the same ratio of omega-6 to omega-3, but the modern diet is high in omega-6 and insufficient in omega-3, so an additional intake of omega-3 might be beneficial.

A genetic variant of the *FADS1* gene has been associated with low levels of omega-3 (EPA) and omega-6 (AA).

GENES ANALYZED: *FADS1*



You present a genotype associated with a lower processing of essential fatty acids. Therefore, you could have diminished levels omega-3 in blood. It is recommended to increase consumption of foods that are rich in omega-3 or take it as food supplement.

## Excessive fat consumption

Fat is a great source of energy and it is required in every diet to provide the essential fatty acids, but also to facilitate the absorption of fat-soluble vitamins. However, excessive consumption can lead to cardiovascular disease, overweight and obesity.

Several recent studies in the US and Europe indicate that the percentage of calories derived from saturated fat is above the acceptable limit, whereas the opposite is true with mono-unsaturated and poly-unsaturated fats.

Certain genetic variations predispose carriers to ingest more fats by increasing their appetite for foods rich in them.

GENES ANALYZED: SLC46A3



You do not have a greater appetite for food that is rich in fatty acids.  
This genotype does not affect you negatively.

## Low vegetables consumption

Fruits and vegetables are the main source of vitamins and minerals in the diet. Its consumption reduces cardiovascular disease and cancer, and it also helps to maintain a healthy weight.

According to the Harvard Public Health School, the recommended daily allowance of fruits and vegetables is 50% of the total intake in a healthy diet. Many people consume less than this amount.

Three genetic variations in gene *TAS2R38* have been studied that predispose to a lower consumption of vegetables due to a greater sensitivity to the bitter taste of some vegetables.

GENES ANALYZED: *TAS2R38*



Women with this haplotype are predisposed to consume less vegetables because of a greater sensitivity to bitter taste. There are no data that affirm the same in men.

Both women and men with this haplotype consume more sweet foods.

## Excessive intake of carbohydrates

Carbohydrates are the main source of energy for the brain and to maintain body weight. In several large-scale studies it has been observed that people with certain genetic variations have a greater appetite for carbohydrates, which can lead to excessive consumption.

The recommended carbohydrate intake is 45-65% of total daily calories. Starch and sugar are the main types of carbohydrates. Cereals and vegetables are sources of starch. Natural sugar is found in fruits and natural juices, while added sugar is present in soft drinks, bottled juices, desserts and sweets.

Excessive craving for carbohydrates is unhealthy, and a healthy diet should contain a balanced combination of carbohydrates, proteins and fats, an adequate amount of fiber and limited added sugars.

GENES ANALYZED: FGF21, LOC10537



You have a genotype associated with a greater appetite for carbohydrates. It is recommended to monitor your intake of carbohydrates and follow a balanced diet in terms of the proportion of macronutrients.

## *NUTRITION – VITAMINS AND MINERALS*

### *Vitamin B<sub>2</sub>*

Vitamin B<sub>2</sub> (riboflavin) is a central component of two molecules that serve as cofactor for various enzymes involved in energy production, carbohydrate, fat and protein metabolism, iron absorption and normal cellular functioning.

Recent research shows that riboflavin plays an important role in cancer prevention and relieves migraine. Deficiency of this vitamin may cause weakness, sore throat, swelling of the tongue, cracking of the skin, hair loss, dermatitis and anaemia. It can also affect vision (including blurred vision), burning, itching, eye pain or light-sensitive sight and fatigue.

Excess riboflavin is excreted in the urine, so there is no risk of overdose.

Certain genetic variants in the MTHFR gene predispose to high levels of homocysteine, a substance related to cardiovascular disease. High levels of homocysteine can be corrected by vitamin B<sub>2</sub>.

GENES ANALYZED: MTHFR



You are predisposed to have normal levels of vitamin B<sub>2</sub> and homocysteine.

## Vitamin B6

Vitamin B6 (pyridoxine) is involved in numerous essential processes, such as protein metabolism, proper functioning of the neurological system, production of haemoglobin, and maintenance of normal levels of homocysteine. Even slight imbalances in vitamin B6 levels can lead to various symptoms: nerve inflammation, irritability, depression, dermatitis, cracked and sore lips, swollen mouth and tongue, and confusion.

Vitamin B6 is found naturally in many foods like peas, whole grains, meat, eggs and fish. Most people get enough vitamin B6 when following a balanced diet.

The genetic marker rs4654748 of the NBPF<sub>3</sub> gene has been associated in numerous studies with reduced levels of vitamin B6, possibly due to a greater degradation of the vitamin in the blood. Studies show an association between vitamin levels and different genotypes; however, this does not mean that your levels are not adequate.

GENES ANALYZED: NBPF<sub>3</sub>



You have the variant of the NBPF<sub>3</sub> gene associated with lower levels of B6, so you are more likely to have a B6 deficiency in blood analysis. It is recommended to increase consumption of food that is rich in this vitamin, or take it as a food supplement.

## Vitamin B<sub>12</sub>

Vitamin B<sub>12</sub> (cobalamin) plays an important role in the functioning of the brain, nervous system and digestive system. It is an essential component for the synthesis and regulation of DNA and for the metabolism of fatty acids and amino acids. It is found naturally in foods of animal origin like meat, fish, eggs and dairy.

A healthy diet provides enough vitamin B<sub>12</sub>, although vegetarians, vegans, the elderly or those with vitamin B<sub>12</sub> absorption difficulties may have a deficiency of this vitamin.

Symptoms of vitamin B<sub>12</sub> deficiency include fatigue, weakness, swelling or numbness and tingling in the hands and feet, inflammation of the stomach and involvement of the nervous system.

A genetic variant in the FUT<sub>2</sub> gene has been associated with low levels of vitamin B<sub>12</sub> in blood.

GENES ANALYZED: FUT<sub>2</sub>



According to Genes analyzed you are at risk of vitamin B<sub>12</sub> deficiency. It is recommended to supplement your diet with methylcobalamin, which is a highly bioavailable form of vitamin B<sub>12</sub> that can directly be used by your body.

## Vitamin C

Vitamin C (ascorbic acid) is a water-soluble compound, critical for many vital processes: it is essential for the functioning of the immune system, the production of red blood cells, the maintenance of connective tissue and blood vessels, bones, teeth and gums. It is a potent antioxidant and participates in the absorption of iron.

Some foods rich in vitamin C are lemons, oranges, red pepper, watermelon, strawberries and citrus juices. While a severe deficiency causes scurvy, variations in vitamin C levels have been associated with a wide variety of complex chronic diseases, such as arteriosclerosis, type 2 diabetes or cancer. High levels of vitamin C have been associated with increased vitality, longevity, and reduced risk of death from cardiovascular disease or cancer.

Vitamin C is transported across the cell membrane via transport proteins, one of which is SLC23A1. A recent large-scale study found that the T allele variant in SLC23A1 is associated with low circulating levels of vitamin.

GENES ANALYZED: SLC23A1



You present the genotype associated with normal levels of vitamin C.

## Vitamin E

Vitamin E is a fat-soluble micro-nutrient formed by a group of eight molecules, with  $\alpha$ -tocopherol being the most abundant. It acts as an antioxidant helping cells to protect themselves from damage caused by free radicals. It is essential for the functioning of the immune system and beneficial for cardiovascular health. It prevents cataracts, age-related macular degeneration and fatty liver disease. It is also essential for the skin because of its anti-inflammatory and photo-protective properties.

Imbalances in vitamin E levels are relatively common and are caused by diets that do not include enough healthy fats, malabsorption disorders and / or genetic variations. The synthetic varieties of vitamin E found in fortified foods and supplements are biologically less active.

A study of 3,891 individuals has found an intergenic marker, rs12272004, near the APOA5 gene, associated with increased levels of vitamin E that benefit the carrier of this marker.

GENES ANALYZED: APOA5



Your genotype is not associated with increased levels of  $\alpha$ -tocopherol. Therefore, it is recommended to increase consumption of foods rich in vitamin E.

## Vitamin K

Vitamin K is a group of fat-soluble vitamins essential for promoting proper blood clotting and bone health. Numerous investigations indicate that an optimal intake of vitamin K contributes to a greater longevity. Vitamin K plays a protective role against various modern diseases such as arteriosclerosis, osteoporosis, diabetes and cancer. Low levels of vitamin K increase the risk of bleeding, calcification of blood vessels and bone fracture.

Vitamin K is often used to treat varicose veins, bruises, scars, burns, as they accelerate healing. Dietary sources that are rich in vitamin K include vegetable oil and green leafy vegetables.

Genetic variations have been reported that contribute to imbalances in vitamin K levels; in fact, some variants have been associated with increased levels while others have contributed to lower levels.

GENES ANALYZED: VKORC1



Your genotype is associated with normal levels of vitamin K.

## Vitamin B9

Folate or folic acid (vitamin B9) works in concert with vitamins B6 and B12 for DNA synthesis and the amino acid metabolism. It is essential for cell maintenance and repair and normal brain development and functioning. Folate deficiency causes higher levels of homocysteine, which is associated with an increased susceptibility to cardiovascular disease and cancer. An adequate level of this vitamin is also crucial for pregnant women and those who are trying to conceive, because it prevents miscarriages and neural tube defects in the fetus.

Several genetic variants in the MTHFR gene are associated with a reduced capacity to metabolize folic acid into its active form. Supplementation with L-5-MTHF, the bioactive form of folic acid, is an absolute necessity for people that carry these variants in order to avoid anemia, elevated levels of homocysteine, pregnancy complications, cardiovascular disease, cancer and cognitive decline.

GENES ANALYZED: MTHFR, MTRR



You have an increased susceptibility to high levels of homocysteine and low levels of vitamin B9. It is recommended to take supplements containing L-5-MTHF, the active form of vitamin B9 that can be used directly by the body. The recommended daily allowance for adults is 400 µg (600 µg for pregnant women).

## Vitamin D

Vitamin D is a fat-soluble vitamin important for the absorption and utilization of calcium, to maintain good bone and muscle health. It is also essential for the normal functioning of the immune, endocrine and cardiovascular system. It can be synthesized in the skin after exposure to sunlight, where it is then metabolized to its active form. It regulates hundreds of genes by binding to the vitamin D receptor.

There is an increase in cases of vitamin D deficiency in developed countries due mainly to photo-protection measures, as well as environmental conditions (contamination, geographical location), dark skin color, being over 50 years, family history of osteoporosis, overweight and personal genetics. Exposure to sunlight is a determining factor in a person's vitamin D levels, because there are few dietary sources of vitamin D. These include fatty fish, fish liver oil and milk or fortified cereals.

Numerous studies have identified genetic variations in many genes that contribute to vitamin D deficiency.

GENES ANALYZED: GC, CYP2R1, VDR



You are predisposed to have lower levels of vitamin D but the binding and transport of this vitamin are normal, so we recommend that you increase the consumption of foods rich in vitamin D (blue fish and fish liver oil) to reach optimal levels.

## Calcium

Calcium is the most abundant mineral in the human body and the main component of bones and teeth. It plays a central role in the functioning of the nervous system and muscles, controls the blood vessels and the secretion of insulin.

It is important to have enough calcium because a long-term deficiency can lead to loss of bone mass and osteoporosis. Calcium levels are tightly regulated, and requirements increase with age: from 50 years on in women and 70 on men.

An adequate daily intake of calcium reduces the risk of osteoporosis, uncontrolled blood pressure and cancer.

The human body does not produce calcium and needs to obtain it from food. Too high blood levels (hypercalcemia) are not healthy either because they can weaken bones and cause problems in the kidneys, heart and brain. There are genotypes that predispose us to low levels of calcium in blood.

GENES ANALYZED: CASR



Your genotype indicates that you are predisposed to have normal blood calcium levels.

## Iron

Iron is an essential mineral for many functions of the body. It forms part of many proteins, including oxygen carriers, hemoglobin (in red blood cells) and myoglobin (in muscle cells). It is also an essential component of antioxidant enzymes.

The absorption, transport and storage of iron is closely regulated, because it is an essential and potentially toxic element. Iron deficiency is the most common nutritional deficiency in the world. Symptoms include fatigue, rapid heartbeat, and palpitations. Children and women of childbearing age, vegetarians and vegans, are people at high risk of iron deficiency.

Although it is an essential mineral, too much iron can be harmful for the body. Some genetic variations increase the absorption of iron, leading to an excess of this mineral, in spite of ingesting normal amounts. At least one in 10 people has a genetic variation of this type. Excess iron can lead to fatigue, anorexia, dizziness, nausea, vomiting, headache, weight loss and shortness of breath.

GENES ANALYZED: Tmprss6, Tf, Abo



You are predisposed to have low levels of iron due to deficiencies in its transport, storage and release. It is recommended to monitor iron levels and adjust your intake (food or supplementation) to reach optimum levels.

## NUTRITION - METABOLISM

### LDL Cholesterol

Low-density lipoprotein (LDL) is the type of cholesterol that can be dangerous if the level is high. LDL cholesterol can form plaques and build up in the walls of the arteries, which can narrow and make these arteries less flexible, increasing the risk of cardiovascular disease (heart attack, atherosclerosis, angina).

Optimal levels of LDL cholesterol are less than 100 mg / dL. Near the optimum levels are 100-129 mg / dL, medium-high levels range from 130 to 159 mg / dL. Levels higher than 160 mg / dL are high and associated with a higher susceptibility to cardiovascular disease.

Our genetic background indicates the likelihood of having high LDL levels. If your genetic risk is low, you are less probable than the average population of having high LDL levels. However, you may still have problems with LDL levels as a result of your diet and other factors. Processed foods rich in trans-fat contribute to increased LDL levels.

GENES ANALYZED: ABCG8, APOB, CELSR<sub>2</sub>, HMGCR, HNF<sub>1A</sub>



Your genetic profile indicates that you share the genotype with people whose LDL levels are close to optimal if you maintain a healthy diet.

## HDL Cholesterol

High-density lipoprotein (HDL) is also known as good cholesterol. High levels of HDL cholesterol protect against heart disease, while low levels (below 40 mg / dL) increase the risk of coronary heart disease. The main mechanism by which this occurs is through the function of HDL in transporting excess cholesterol from the arteries to the liver.

In men, typical levels of HDL are 40-50 mg / dL. In women, the female hormones cause slightly higher levels of HDL of 50-60 mg / dL, however, after menopause there is a tendency to decrease. Food that contain trans fats lowers HDL levels, which is not healthy.

Variants in various genes have been associated with blood levels of HDL, which contribute cumulatively to increased health benefits.

GENES ANALYZED: ABCA<sub>1</sub>, RAB11B, CETP, FADS<sub>1</sub>, GALNT<sub>2</sub>



You have a higher probability to low HDL levels (less than 40 mg / dL). It is recommended to control your level of HDL in blood and restrict trans-fat from your diet.

## Triglycerides

Triglycerides are a type of fat that builds up in your body. When you eat, your body converts any calories it doesn't need to use right away into triglycerides. People with elevated triglycerides have an increased risk of cardiovascular disease and type 2 diabetes.

Having high triglyceride levels is often associated with conditions such as lack of exercise, excessive alcohol consumption, smoking, excessive consumption of refined carbohydrates and overweight. Normal levels are below 150 mg / dL, the mid-high range is between 150 and 199 mg / dL, and levels above 200 mg / dL are considered high and associated with an increased susceptibility to disease.

Scientific studies have shown that variants in genes related with lipoprotein metabolism are associated with triglyceride levels.

GENES ANALYZED: DOCK7, APOB, FADS1, LPL, BAZ1B



You are more likely to have elevated triglyceride levels (above 150 mg / dL). It is recommended to monitor triglyceride levels in blood and adjust your diet accordingly.

## NUTRITION - SENSES

### Bitter taste

Taste perception plays a fundamental role in our preferences and eating habits, creating aversion or attraction towards certain types of food and drinks. An adverse response to the bitter taste is instinctive and leads us to reject it.

The perception of bitter taste is due to genetic variations in various receptors: when we ingest food, molecules such as phenylthiocarbamide interact with saliva and bind to taste receptors in the mouth, giving the sensation of bitter taste. People with certain genetic variants are sensitive to the bitter taste of beneficial vegetables (such as broccoli, Brussels sprouts, cabbage, cabbage) or drinks (such as coffee and black beer).

There is evidence that genes responsible for taste play an important role in human health. A new study has found that people who are more sensitive to bitter taste naturally are also more likely to add salt to food, often exceeding the recommended amount. In addition, these people are more likely to avoid healthy foods like green leafy vegetables and broccoli.

GENES ANALYZED: TAS<sub>2</sub>R<sub>38</sub>



Your genotype is not associated with a greater sensitivity to bitter taste, so you will not have problems when eating vegetables and other foods with this flavor.

## Pecking

Pecking can be a healthy or unhealthy behavior. Balanced food containing unsaturated fatty acids, proteins, fiber, and low-glycemic carbohydrates in small portions can help quench hunger and reduce total calorie intake, while junk food can have negative health effects.

Genetic markers associated with pecking include variants in the receptor for leptin, an essential hormone in the regulation of food intake. Some people feel hungry more often than others, which prompts them to eat impulsively and increases the risk of becoming overweight.

Variations in the LEPR (leptin receptor) and FTO gene have been associated with a greater impulse to eat between hours. This association has not been studied in men. This section is only valid for women.

GENES ANALYZED: LEPR, FTO



You do not have a special predisposition to eat between hours.

## Sweet tooth

Sweet taste detection is mediated by taste receptors. Culinary culture, habits and your age influence your food preferences, but genetics also play an important role in this regard.

Genetic variants in various genes predispose to a greater preference for sweet taste. Intake of healthy foods with a sweet taste (present naturally) can help satisfy this desire without necessarily increasing daily calories. However, excessive craving for processed sweet foods can be harmful for health and increase daily calorie intake.

GENES ANALYZED: TAS2R38, FGF21



You have a slightly increased preference for carbohydrates. Avoid processed sweet food to control your weight and benefit your health.

## Caffeine

The enzyme cytochrome P450A2 is primarily responsible for metabolizing caffeine. Depending on the genotype, people may be rapid metabolizers, or they may metabolize caffeine more slowly.

People with normal metabolism take about 45 minutes to absorb 99% of caffeine. In humans, the half-life of caffeine is between 4 and 6 hours, which explains why the effect of drinking coffee lasts that long. However, genetic variations that modify the metabolism of caffeine may create hypersensitivity to this substance. These people react to very small amounts of caffeine, even at amounts below 100 mg, and may experience symptoms of overdose such as insomnia, nervousness and increased heart rate. Hypersensitive persons need more than twice as much time to metabolize caffeine than the general population.

GENES ANALYZED: CYP1A2



Your genotype is associated with a slow metabolism of caffeine, so you may have overdose symptoms. It is recommended to limit consumption of soft drinks with caffeine, coffee, black tea, etc.

## NUTRITION – WEIGHT MANAGEMENT

### Predisposition to overweight

Obesity is caused by environmental factors in combination with genetic factors. Approximately 40 to 70% of the predisposition to obesity is inherited. When someone reaches a body mass index (BMI) of 30 to 35 (obesity) or above 40 (morbid obesity), genetic factors with a strong effect are most likely involved.

Your genetic predisposition to obesity is determined by your genotype in variants of the FTO and MC<sub>4</sub>R genes, which are associated with a higher BMI. The MC<sub>4</sub>R gene is expressed at the center of brain starvation and is involved in the regulation of energy balance. The FTO gene is important in controlling eating habits and energy balance. On the other hand, adiponectin is a hormone produced by adipose cells. In the body it causes the liver and muscles to consume energy from fat. High levels of adiponectin are beneficial for weight loss. If you have low levels, losing weight can be a good way to increase your adiponectin levels. A variant of the adiponectin gene (ADIPOQ) is associated with its levels.

GENES ANALYZED: FTO, MC<sub>4</sub>R, ADIPOQ, ADRB<sub>2</sub>



You are more likely than the general population to have a high BMI (body mass index), which does not mean that you are obese. However, because lifestyle has a considerable impact on weight, you can reduce your risk by following a proper diet, exercising and reducing your stress.

## Eating desire

Although there is no objective method to quantify the desire to eat or taste for a particular type of food, behavioral scientists have devised techniques to measure individual motivation to consume food and compare it among different people. This measure, called food reinforcement value, describes how much effort a person is willing to make to get a particular type of food. This value can be determined through a series of laboratory tests. In each, the individual who is being tested is asked to complete a task in exchange for a small portion of their favorite food. The homework on the initial test is easy, so the food is not hard to get. As the test continues, the tasks are becoming more complicated and, at a certain moment, the participant feels that the effort to get the food is not worth it and decides to leave it. Using these techniques, a study has identified a genetic component associated with the desire to eat.

GENES ANALYZED: ANKK1



Your genotype is associated with normal values of food reinforcement.

## Feeling of satiety

Satiety refers to the physical sensation of feeling full when eating. When satiety is normal, the brain receives a signal that it has consumed enough, and the hunger feeling disappears.

People with genetic variations in some genes like FTO are more likely to eat more without feeling full and satisfied. The FTO gene is an important factor that predisposes you to having a healthy or unhealthy weight.

There is also a correlation between low satiety and weight gain. People with low levels of satiety tend to eat more and consume food rich in sugar and fat. To improve satiety, you can increase the amount of dietary fiber and eat balanced and healthy food throughout the day. Examples of high fiber foods include whole wheat bread, oats, barley, lentils, black beans, artichokes, raspberries and peas.

GENES ANALYZED: FTO



Your genotype indicates that your feeling of satiety is normal.

## Emotional eating

Emotional intake, or loss of control over intake, describes the tendency to eat more than normal in response to stimuli such as the taste of food or situations that trigger overeating, such as emotional stress, anger, anxiety or particular social situations.

Studies indicate that genetic variation in the TAS2R38 gene, responsible for the detection of bitter taste, make some people more likely to eat compulsively when in certain moods. It seems that this mechanism is mediated by the endocannabinoid system of our body, which regulates the energy metabolism influencing the appetite.

GENES ANALYZED: TAS2R38



Your genotype is not associated with increased intake for emotional reasons.

## Difficulty losing weight

Not all people lose weight at the same speed. Some lose weight easily after only one week of a low-calorie diet, while others keep trying different types of diets without any result.

Scientific studies found that a person's genetics are responsible for the ability or difficulty to lose weight. Carriers of certain genetic variations have more difficulty losing weight and improving their metabolic status.

People with genetic variants associated with obesity, sensitivity to fat, type 2 diabetes and emotional intake do not lose weight as easily as other people, despite following the same diet and performing the same exercise. Some diseases and medication can also prevent weight loss. The most common are hypothyroidism, hormonal changes in women, chronic stress and depression.

GENES ANALYZED: TCF7L2, PPARG, PPM1K, MTNR1B,  
CLOCK



Your difficulty in losing weight is intermediate. Follow a diet that is right for you and exercise to reduce your weight.

## Effectiveness of the Mediterranean Diet

The benefits of the Mediterranean diet for health are well known. Numerous studies have associated the follow-up of a Mediterranean diet with a low risk of obesity. It has been observed that people who most followed this diet lost more weight and reduced their waist more than the rest.

The Mediterranean diet is rich in vegetables, fish, fruit, legumes, nuts and olive oil, while meat and dairy products are minor components.

Taking into account the interaction between diet and personal genetic predisposition to obesity we can know how effective this diet is for each person. Genetic variations in various genes like PPARG, among others, determine if the Mediterranean diet helps to lose fat.

GENES ANALYZED: PPARG, TCF7L2



Your genotype does not benefit especially from this type of diet to lose weight.

## Effectiveness of the Low-Fat Diet

According to the World Health Organization, in a balanced and healthy diet it is recommended to reduce total fat consumption to less than 30% of daily calorie intake. In addition, it is advisable to reduce the consumption of saturated fats to less than 10% of daily caloric intake and replace those fats with unsaturated fatty acids (mono and polyunsaturated).

A low-fat diet restricts fat intake to 20% while increasing protein intake from 20-25% to 40%, and decreasing the proportion of carbohydrates (whose general recommendation is 55-60%). Numerous large-scale studies on weight loss have found that people with variations in genes associated with fat sensitivity (such as FTO, PPARG, PPM1K) respond best to a low-fat diet.

GENES ANALYZED: FTO, PPM1K, IRS1, QPCTL



Your genotype indicates that you have a greater genetic predisposition to lose weight and stay at a healthy weight if you follow a low-fat diet. For this we recommend reducing the fat intake to 20% and increasing the proportion of proteins. It is important to include healthy fatty acids (mono and polyunsaturated) in your diet.

## Response to Mono-unsaturated Fats

Fat is an important part of the diet and not all fatty acids are bad. Mono-unsaturated fatty acids are considered healthy dietary fats, among them are omega-7 and omega-9. These are known for their anti-inflammatory properties, for lowering triglycerides and lowering blood pressure. They are also healthy for the heart and beneficial for the skin, since they contribute to maintain the level of hydration of the epidermis.

The Mediterranean diet, known for its many benefits, is rich in monounsaturated fatty acids, present in food such as avocados, olives, walnuts, olive oil. Genetic variants in the PPARG gene have been associated with a lower weight in women consuming more than 13% of daily calories in the form of monounsaturated fats. This section only applies to women.

GENES ANALYZED: PPARG



Your genotype is normal. Monounsaturated fatty do not affect you differently.

## Effectiveness of the Low Carbohydrate Diet

Carbohydrates are the main source of energy in a diet, accounting for between 45% and 55% of the daily intake. They are the macronutrients from which we get the energy our body needs. Simple carbohydrates give us immediate energy while complex carbohydrates ensure an energy supply throughout the day.

Simple carbohydrates are found mostly in fruits; and complex carbohydrates in vegetables, cereals and legumes. They are a source of fiber, an essential component in the diet that is very important for intestinal health.

Slimming diets typically reduce the amount of carbohydrate and increase protein, but not all people respond equally to this reduction. It has been observed that a polymorphism in the FTO gene, linked to obesity, is related to a better response to low carbohydrate diets.

GENES ANALYZED: FTO



Your genotype is associated with greater weight loss if you follow a low carbohydrate diet.

## *SPORTS PROFILE*

### Power

Muscle power measures the maximum amount of force that can be exerted over a limited period of time. Fast twitch fibers generate a relatively high amount of force over a short period of time. They are characterized by great strength, power and speed, but they fatigue faster than slow twitch fibers. Fast twitch fibers have a lower capacity to obtain aerobic energy, lower oxygen levels and higher levels of glycogen, so they get their initial energy from glycolysis (anaerobic respiration) for muscle contraction.

This process is very fast, but it is also quite inefficient to produce energy. It also produces lactic acid that causes muscular fatigue. This explains why fast twitch fibers tire faster.

Power is inherited by 80% depending on the type of specific muscle.

GENES ANALYZED: ACE, IGF2BP2, NOS<sub>3</sub>, PPARG, AGT



Your genetic predisposition to excel at power sports is low.

## Resistance

Resistance training is defined as a low intensity activity performed over a long period of time. Muscle endurance measures your ability to repeat an activity for a while without feeling tired. If your muscular structure favors endurance you have the potential to thrive in exercises that take advantage of this ability.

The intrinsic ability to perform resistance exercises is influenced by several factors. First, resistance depends on the proportion of slow twitch fibers of skeletal muscle. They are also known as red fibers because they contain more myoglobin, a protein that stores oxygen, and they get their own energy source, so they can maintain their strength for longer. Second, it has been observed that the best athletes usually have the so-called "marathon genes".

Genetic variants associated with a high proportion of slow twitch fibers and a high supply of oxygen to muscle tissue are more common in endurance athletes.

GENES ANALYZED: PPARGC1, ACE, NFIA, HIF1A



Your genetic predisposition for endurance sports is intermediate.

## Aerobic capacity

Maximum aerobic capacity (or maximum volume of oxygen,  $VO_2\text{max}$ ) is the maximum volume of oxygen an athlete's muscles can use for one minute to produce maximum physical effort. This measure reflects the person's aerobic physical condition and determines their potency during prolonged exercise.

The benefits of having a good aerobic fitness are low blood pressure, low cholesterol and low risk for obesity, type 2 diabetes and cardiovascular disease.  $VO_2\text{max}$  is measured in L / min but is more commonly expressed in mL of  $O_2$  / kg / min, which permits to equitably compare athletes whose body mass is different.

The absolute values of  $VO_2$  max are usually 40-60% higher in men than in women. Beginning at the age of 30 our lung capacity begins to decline. At the age of 50 it may be only half. This means that as we age, less oxygen enters our cells, which explains lack of respiration, decreased endurance and increases susceptibility to respiratory diseases.

Numerous genetic variants have been associated with aerobic capacity.

GENES ANALYZED: NFIA, RGS18 ACSL1



Your genetic advantage predisposes you to a very good lung capacity.

## Strength

Regarding physical condition, force is defined as the capacity to overcome a resistance with the contraction produced by the muscles. It translates as the capacity of the muscles to perform a work load. The quality of the strength is determined by the muscular structure itself: it depends on the orientation, length and types of muscle fibers. Also, muscle contraction is more rapid and potent when the internal temperature is slightly higher than normal. Furthermore, force also depends on our bone structure and the type of lever that makes the movement. Strength is also different between gender and changes with age.

Training is a very important factor because it improves the factors that determine the level of muscular strength, such as metabolism and fuel deposits that allow the increase of muscle fiber thickness, the number of myofibrils and the delay in the appearance of muscle fatigue.

Genetic factors are associated with a greater benefit in increasing strength after training.

GENES ANALYZED: INSIG2



Strength training is less beneficial to people with your genotype, as you are likely to gain fat mass. Moderate training is more suited for you.

## Cardio and Pulmonary capacity

Cardiac function has a direct impact on exercise and vice versa. Scientists have shown that regular exercise increases heart capacity and strengthens the heart. This capacity is measured as heart rate. It decreases with age, so it is especially important to maintain and monitor the health of our heart.

Pulmonary capacity is the air that the lungs get when inhaled and influences the body's ability to distribute oxygen to cells, where the oxygen is used as an energy source for exercise.

Some people are carriers of genes increase the heart capacity, allowing them to have better results improving strength during exercise. Other variants have been associated with improved lung capacity after training.

GENES ANALYZED: NPY, NOS<sub>3</sub>, ADRB<sub>1</sub>, APOE



Your genetic advantage for developing better heart and lung capacity is low.

## Resilience

Prolonged exercise involves muscle lengthening and may result in structural muscle disruption, deterioration of the excitation-contraction process, inflammation, and breakdown of muscle proteins. This process is known as exercise-induced muscle damage, and although a certain amount of muscle damage is required for adaptation, excessive damage or inadequate recovery of muscle damage may increase the risk of injury.

After performing physical exercise, some people recover quickly and are ready to make a physical effort again after a brief rest. Other people do not recover so quickly, they need a longer rest time.

Research has shown that certain genetic variants are associated with a slower recovery after hard exercise. People with these markers should take special care of their training plan.

GENES ANALYZED: IL6, CRP, SOD<sub>2</sub>



Your genotype is associated with high levels of inflammation and low levels of antioxidants, which predisposes you to a slower recovery after exercise. Supplementing your diet with an extra source of anti-oxidant and detoxification can help to speed up recovery process.

## *SPORTS – MUSCLE PROFILE*

### **Muscular strength**

Muscle strength is the amount of force a muscle can exert in a single contraction. Muscles have two types of fibers, fast and slow. Fast twitch fibers provide explosive energy, for example, for weight lifting or speed. Slow-twitch fibers are for longer resistance exercises.

Developing fast-twitch fibers requires anaerobic activities, whereas for the development of slow-twitch fibers aerobic exercise is necessary.

Muscle strength is determined by fast fibers which provide rapid explosions of energy. Up to 90% of the variation in muscle mass and up to 60% of variation in muscle strength are heritable.

GENES ANALYZED: HFE, IGF<sub>1</sub>, HIF<sub>1A</sub>, GDF8



You do not have an extra benefit in terms of having greater strength and muscle mass.

## Muscle response to resistance training

Although anaerobic short-term training is generally recommended to build muscle, systematic long-term resistance training increases skeletal muscle size and strength in men and women, as well as the aerobic capacity of fast twitch fibers.

Studies have shown that almost all people benefit from endurance exercises, but the gain in muscle size and strength is highly variable among individuals depending on gender, age, general health, nutrition and personal genetics.

Genetic variations make some people gain more strength and muscle size in response to the same training as others.

GENES ANALYZED: BMP2, IL15RA, INSIG2



Your genotype is not associated with an increased gain in muscle strength from resistance training.

## Skeletal Muscle Performance

Muscles such as biceps, pectorals and quadriceps are skeletal muscles that are attached to the skeleton to generate movement. Skeletal muscle is composed of elongated, thin cells, which include all the organelles necessary for cellular functions. More than 90% of the total volume of skeletal muscle cells is composed of muscle proteins, including actin and myosin contractile proteins.

When a muscle cell is activated by a nerve impulse, the interaction between actin and myosin generates a contraction. The total force depends on the sum of all the contractions that occur simultaneously in a muscle cell.

Skeletal muscle is one of the three main types of muscles, the other are the heart and smooth muscle. Genes UCP2 and UCP3 can negatively regulate mitochondrial ATP synthesis (the energy that muscles use) and thereby influence physical performance. Genetic variants in these genes are associated with improved skeletal muscle performance with training.

GENES ANALYZED: UCP<sub>2</sub>



You present an increase in the efficiency of muscle contraction with training.

## Muscular fatigue

Muscle fatigue occurs when muscles cannot exert normal force, or when it takes more effort than normal to achieve a desired level of strength. Late-onset muscle pain describes a phenomenon of muscle pain or stiffness that is felt 12-48 h after exercise, particularly when starting a new training program, after a change in sports activity or after a considerable increase in duration or intensity of the exercise.

The proteins of an injured muscle are released into the blood. A higher concentration of these proteins means greater damage to muscle fibers and a greater likelihood of muscle fatigue.

Certain genetic variants are related with a better resistance to muscular fatigue.

GENES ANALYZED: HNF4A, NAT2



The likelihood of your muscles suffering damage and fatigue is average.

## Muscle regeneration capacity

Muscles are important for exercise and need between 24 and 48 hours to be repaired and rebuilt. Making them work again too soon simply leads to tissue breakdown. Are you one of those people who needs a lot of time to recover after a muscle damage?

Prolonged and tiring exercise such as high intensity training activates inflammatory factors. Genetic variations in several genes improve the inflammatory response that affect the time that is needed to repair muscle damage after exercise.

A person with a high predisposition to inflammation will benefit from less frequent exercise and longer recovery periods. If the body is not fully recovered there could be damage due to overexertion and excessive training. This is particularly important for high intensity athletes and bodybuilders.

GENES ANALYZED: IL1B



According to your genotype, your muscle regeneration capacity is low, therefore you will need a longer recovery period.

## *SPORTS – METABOLIC PROFILE*

### *Benefit of sport for your body*

The benefits of exercise and regular physical activity are well known, and all people, regardless of age, sex or physical ability can notice its benefits. Exercise can prevent overweight or help maintain a healthy weight, as well as prevent many health problems such as heart disease, metabolic syndrome, type 2 diabetes, depression, cancers and arthritis. Exercise releases oxygen and nutrients to tissues and helps the cardiovascular system to work more efficiently. With better health of heart and lungs, the body has more energy.

Some people experience the benefits of exercise more quickly than others, while the latter also require dietary changes. People with certain genetic variants experience rapid results from exercise to lower cholesterol, triglycerides and blood pressure.

GENES ANALYZED: CETP, BDNF



The benefits of the exercise you will experience are the same as the general population.

## Benefit of Exercise on Insulin Sensitivity

Insulin helps control changes in glucose levels (commonly known as sugar) in the body. Insulin sensitivity refers to the body's ability to respond to these changes. Having a greater sensitivity to insulin means that the body has a better ability to process glucose. Insulin resistance, on the other hand, is an alteration that impedes the proper regulation of glucose and is associated with obesity and type 2 diabetes.

Many people can benefit from exercise to increase insulin sensitivity. People with the beneficial genotype in a marker of the LIPC gene show an increased benefit to increase insulin sensitivity.

GENES ANALYZED: LIPC



You gain increased benefit from exercise to increase insulin sensitivity. This is especially important if you are diabetic, overweight or have metabolic syndrome.

## Benefit of Exercise on Cholesterol

One of the benefits of exercise is the improvement in cholesterol levels. HDL cholesterol is known as good cholesterol and having high levels of HDL is beneficial. Many people can improve their HDL levels with exercise.

Research has shown that exercise stimulates enzymes that help move bad cholesterol from the blood to the liver, allowing it to be excreted with bile. Exercise also increases the size of protein particles that carry cholesterol through the blood, reducing the possibility that small particles clog arteries.

Individuals with certain genetic variants will quickly increase good cholesterol levels while exercising, while carriers of other genetic variants are less likely to lower the bad cholesterol levels with exercise alone.

GENES ANALYZED: CETP, PPARD



Your genotype is not associated with an extra benefit to regulate your cholesterol levels with exercise.

## Benefit of Exercise on Body Mass Index

Exercise is an important part of all weight loss plans and is a crucial tool to maintain a healthy weight. Physical activity is beneficial for all people, regardless of their genetics, but exercise is especially recommended for people with an increased risk of being overweight.

People with a certain variant in the genetic marker of the FTO gene are more likely to be overweight, with an increased body mass index and waist circumference. However, the genetic susceptibility to obesity-induced variant in the FTO gene can change by adopting an active lifestyle. In fact, people who are more susceptible to obesity experience greater weight loss by exercising at moderate intensity.

GENES ANALYZED: FTO



Your genotype is not associated with an extra benefit of losing weight rapidly by exercising.

## Metabolic efficiency

The metabolism is the total of biochemical processes that the body undergoes to convert food into energy. It is a concept that is related to the way in which our body makes use of those nutrients. Physical fitness is a very complex phenotype influenced by numerous genetic and environmental factors that contribute to interindividual variation.

Variations in various genes play an important role in responding to different types of physical activity and have a physiological impact on sports performance. They are genes involved in the metabolism of fatty acids whose expression can improve the oxidative capacity of skeletal muscle during exercise. Different variants result in an increased or decreased efficiency to obtain energy from fatty acids and other nutrients.

GENES ANALYZED: AMPD<sub>1</sub>, PPARA, ADRB<sub>2</sub>, PPARD, PPARGC<sub>1</sub>



According to your genotype the efficiency of your metabolism is intermediate.

## *SPORTS – INJURY RISK*

### *General risk of injury*

Exercise has numerous health benefits, but we must be careful to avoid injuries that occur from exercising incorrectly. Although injury is always a risk in any sport, some people are more likely to injure themselves than others because of their genetics.

Genetic variations influence the risk of injury and people with an increased risk should adjust their training plan. The genetic risk of injury is calculated by considering variations in genes related to general inflammation. When suffering from a soft tissue injury, levels of inflammation influence recovery.

GENES ANALYZED: GDF5, COL1A1, IL6, CRP



Your genetic characteristics make you moderately vulnerable to tendon, ligament and muscle injuries.

## Risk of injury to joints

Many sports-related injuries involve joint damage. The most common are wrist or ankle sprains, excessive elbow extension, or damage to the knee ligaments.

Certain people have a higher risk of injury from excessive use of joints, but they can strengthen and avoid injury by doing the exercise correctly and stretching. The risk of joint damage is associated with an increased genetic predisposition to osteoarthritis.

Knowing personal risk is important to adjust the duration and intensity of training sessions. Sports and high-impact activities can lead to cartilage injuries and damage to the joints. Your risk of injury is calculated on genetic variations that are associated with joint problems.

GENES ANALYZED: GNL3, FTO, SUPT3H, IL1A



You have a low chance of injuring your joints.

## Risk of overload fracture

Overload fractures are small cracks in the bone caused by repetitive force or repetitive movements, such as running long distances or jumping repeatedly. They can also be caused by normal use of a weakened bone.

Everyone may have an overload fracture, but some people have a greater predisposition, which is associated with lower bone density. Overload fracture is a common injury in sports and affects up to 20% of athletes, particularly women.

The main risk of overload fracture is the bone density. Up to 85% of the variability in bone density is explained by genetic variations. Some variations increase risk while others have a protective role.

GENES ANALYZED: FUBP<sub>3</sub>, RIN<sub>3</sub>, C17ORF5, MEPE, ZBTB<sub>40</sub>



You have a high risk of suffering overload fracture. It is recommended to pay special attention in obtaining an adequate supply of vitamin D and calcium.

## Risk of ruptured tendons and ligaments

The ligaments are designed to stabilize the joints. Strong tendons and ligaments minimize injuries, although overuse induces changes that make them vulnerable.

Anterior cruciate ligament (ACL) tears are one of the most severe injuries and are very common among high intensity athletes. They are caused by sudden deceleration, accelerations or jumps while the knee is flexed. ACL injuries usually occur along with damage to other structures of the knee, such as articular cartilage, meniscus or other ligaments.

Achilles tendon injuries are a major obstacle to any athlete's performance. They affect athletes in a wide variety of sports (up to 20% of runners) and can often take months to heal.

Individuals with favorable genetic variations may have stronger ligaments and tendons than the general population and a decreased risk of injury. Knowing your genetic susceptibility to specific injuries will help you customize exercise and choose prevention strategies.

GENES ANALYZED: COL1A1, MMP3, GDF5, COL12A1



You have a low probability of suffering ligament and tendon injuries associated with the sport.

## *SPORTS – CARDIOVASCULAR PROFILE*

### *Ability to reduce heart rate*

Heart rate is generally used as a measure to regulate exercise intensity and to monitor your progress, taking into account that your heart rate will decrease substantially with exercise.

Regular physical activity improves cardiac function and various risk factors. However, the cardiovascular benefits of physical activity are not the same for all individuals. If your body has a low response to exercise, the expected decrease in heart rate may not occur. It is important to know if the genes analyzed do not cause unnecessary stress on the heart.

A slow recovery of the heart pulse after exercise is associated with an increased risk for cardiovascular problems. While heart rate during exercise is known to decrease in response to regular exercise, recovery after exercise is considered a risk factor. Genetic variation largely explains interindividual differences.

GENES ANALYZED: CHRM<sub>2</sub>, ADRB<sub>1</sub>



Your response to the exercise to decrease your heart rate is intermediate. You recover your pulse just like the general population.

## Response of blood pressure to sports

High blood pressure, known as hypertension, is a common health issue. It is estimated that most people will have hypertension at some point in their life. Exercise has been shown to lower blood pressure. In fact, aerobic training is generally recommended as a therapy to prevent, treat, and control hypertension.

An hour and a half of low-intensity aerobic exercise helps to lower blood pressure. There is great variability in the interindividual response to the antihypertensive effect of exercise, and much of this variation is explained by genetic predisposition.

People with a tendency to increase the response to exercise decrease their blood pressure more quickly than the average population. For these people the benefits of 30 minutes of exercise a day are more noticeable than for the general population.

GENES ANALYZED: EDN<sub>1</sub>, NOS<sub>3</sub>, GNAS, ADD<sub>1</sub>



Your blood pressure decreases faster with exercise than in the rest of the population.

# *NUTRITION AND WEIGHT MANAGEMENT RECOMMENDATIONS*

## **Weight control**

- The Mediterranean diet is beneficial for your health, but not particularly to lose weight.
- You are predisposed to consume too much sweets and carbohydrates. Limit these from your diet.
- The types of diet that work for you are low-fat and low-carbohydrates. A protein-rich diet is ideal.
- Physical exercise is also beneficial for you to reduce weight.

## **Nutrient requirements**

- Increase consumption of omega-3 fatty acids
- You have a higher need for following vitamins and minerals: B6, L-5-MTHF (The active form of vitamin B9), Methylcobalamin (the active form of vitamin B12), vitamin D, vitamin E, iron.

## **Metabolism**

- You are predisposed to have lower values of HDL and increased levels of triglycerides. Control these parameters through regular blood analysis.
- Limit drinks with caffeine.

**Any changes you want to make to your diet or health treatment should be discussed with a health professional.**

## *SPORTS AND FITNESS MANAGEMENT RECOMMENDATIONS*

- You are predisposed to perform better in endurance sports than power sports.
- Exercise has an increased benefit on insulin sensitivity, which is very important if you are diabetic. It also lowers blood pressure faster than in the general population, but it does not have an increased effect on lowering cholesterol levels.
- Strength training is less beneficial for you and not effective to lose fat.
- Due to a higher level of inflammation and decreased levels of antioxidants, your muscle regeneration capacity is lower, and you need longer recovery time after exercise.
- You are moderately vulnerable to injuries of tendons, ligaments and muscles. with a high risk of suffering overload fracture.
- It is recommended to take an extra source of antioxidant and detoxification as food supplement.
- An adequate supply of vitamin D and calcium is also very important.

**Any changes you want to make to your diet or health treatment should be discussed with a health professional.**