myDNAmap
sports

myDNAmap
the power of your genetics

myDNAmap is a medical genome company that was established with the aim of helping the general public to access all of the information included in their DNA, so they can better care for their health and that of their family.

myDNAmap offers a unique and comprehensive service in the field of preventative medicine. We sequence the whole genome containing all of the genes associated with a person's health and wellbeing. We provide pre- and post-sequencing advice, which will answer any questions and explain the results. We have developed **myDNAapp,** a mobile app where you can consult your results, contact health and science professionals and enter information regarding your health, which helps to personalise your genetic report. Furthermore, **myDNAmap** offers annual updates, which include the most recent discoveries in the field of genetics.

We know that every one of us is unique and individual just like our DNA.

Knowing your genetic profile will help you to take care of your health and that of your family. Today, tomorrow and always.

Always check **mydnamap.com** for the latest updates of our services.

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Knowing your genetic profile, you will be able to:

- get the maximum benefit from your physical activity.
- achieve better athletic performance.
- prevent injuries.
- maximise muscular endurance and increase your strength.
- improve your resistance to fatigue.

avoid risk of fractures.

- learn how you can influence your physical routine to control your weight.
- avoid cramps.
- understand more about your exercise motivation.

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Learn about your genetic profile and improve physical activity benefits

Thanks to scientific knowledge available today, through genomic medicine you can optimise your sports performance, maximize the effects of physical exercise and undertake sport safely.

myDNAmap offers a premium genetic test , which describes how your genetic profile can influence your performance. Based on this genomic knowledge, it is possible to intelligently customise your training programmes, so you can benefit from potential advantages and limit weaknesses. In this way you can achieve better athletic performance, prevent injuries and optimise recovery, and thus reach maximum conditioning levels.

The key to our test is an integrated analysis of scientifically relevant genetic variations regarding your physical ability, your predisposition to injuries and your capacity to recover. This allows the progressive achievement of your sports or training objectives and allows you to reduce your physical activity dropout rate.

We offer the most comprehensive genetic sport test on the market. The **Sports myDNAmap Panel** analyses more than 100 genetic variations associated with athletic potential and sports performance. The result of this overall panel analysis enables a broad view of your athletic ability so you can customise sport strategy according to your specific potential and to help you avoid injuries.

Muscular endurance

Muscular endurance allows you to carry out an activity or effort for the longest time possible, using oxygen for energy production. It represents the body's ability to repeat an activity for a period of time without getting tired. Skeletal muscle fibres are classified as rapid, slow or intermediate, depending on the contraction time. Each type of fibre is unique in its ability to contract in a certain way and influence how the muscles respond to physical activity. Muscular fibre characteristics are genetically determined. Different tests have identified genetic variations associated to size, strength and oxygen supply to muscle tissue. People with specific genetic types are better in resistance activities than others. A clear example of these types of association is the case of "marathon genes" *(ACTN3)* observed in elite athletes. An overall report on your genetic profile associated with types of muscle fibres enables a better understanding of how to maximize your response to training.

Muscular strength

Strength is defined as the ability to generate intramuscular tension when faced with a resistance, regardless of whether movement is generated. Period and systematic resistance training enables diverse adaptations such as hypertrophy, an increase in energy consumption and muscle mass and body fat proportion control. Similarly, it promotes the increase in bone mineral content, making it stronger and more resistant. It increases strength in the non-contractile structures, like tendons and ligaments. It helps to prevent bad postural habits. It enables significant neuromuscular adaptations. It improves sports performance and is an essential component of any rehabilitation programme. Strength is determined by the biological structure of the muscle that, in turn, is determined by genetic factors. Genotypes have been described that are associated with a greater benefit when it comes to increased strength following training.

VO2 max | aerobic capacity

VO2 max is the maximum amount of oxygen that our body can transport within a specific time interval. This is usually expressed in litres per minute (L/min). In a certain way, VO2 max allows us to know our aerobic capacity for any physical activity. The more intense the activity the more oxygen we need to transport and consume. From what we are aware, our VO2 max helps us to know our sport limits. We know that people with certain genotypes have better aerobic capacities than others. Our test analyses genetic variations associated with the personal likelihood of having a higher or lower VO2 max, their muscle oxygen supply and their tolerance to fatigue. Studies exist that connect certain genetic variations with a better resistance to muscular fatigue

Cardiovascular risk

Cardiovascular diseases constitute the main cause of death and long-term disability. Cardiac function has a direct impact on exercise and vice versa. Scientific studies show that regular exercise increases cardiac capacity and strengthens the heart. For athletes, genetics provide scientific knowledge that can help with the optimisation of performance, enhance the effects of physical exercise and assess the risk of a hereditary disease associated with sudden death.

Sports injury risk: tendons, ligaments and joints

Sport is good for your health but injuring yourself is always a risk when undertaking any kind of exercise, even more so when the physical exercise is undertaken incorrectly. Nevertheless, there are people who have a greater disposition to injury than others and, in part, it is due to their genetics. Certain people from specific genotypes may have stronger ligaments than others. Scientific evidence has associated certain genetic variations with a greater disposition to risk of injuries to joints and other areas. Once we know these genetic factors that may predispose to injury, the first step is to adjust the training plan and help to prevent them. We will know, for example, which exercises to do and which to avoid.

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Sports injury risk: bone fractures

The most predictive factor of developing fractures is the determination of bone mineral density (BMD). Nevertheless, other risk factors such as age, sex and a personal or family history of fractures can be very significant when predicting risk. We analyse polymorphisms related with BMD and bone fractures to identify possible cases of a likelihood of low mineral density. Different tests establish the influence of specific genetic variations as a predictive factor for the emergence of fractures. Some variations increase risk, whilst others have a protective role.

Sports injuries risk: muscular injuries and recovery times

The exercise process can cause inflammation and tissue damage. Muscular injuries are one of the main causes for a reduction or break in sporting activity. There are various factors associated with the variability of muscle damage: sex, age, hydration, body mass and genetic components. There is a relation between polymorphisms in the genes *IGF-2, CCL2, ACTN3, IL-6, TNF*α and the severity and response to muscular damage produced by eccentric exercise, associated with recovery times or periods of muscular rest. There are genetic variations that improve inflammatory response, which enable repair of muscular damage following exercise.

Motivation to exercise

Different tests have associated genetic variations with a greater adherence and perseverance to physical exercise with a healthy lifestyle. Certain genotypes could explain why some individuals undertake physical activity, whereas others lack motivation to maintain it.

Sporting capacity: muscle cramps

Exercise-associated muscle cramps (EAMC) are very common and can be caused by multiple factors: dehydration, nutritional deficiencies, ischaemia, inadequate training and excessive exercise. They are defined as the painful, spasmodic and involuntary contraction of skeletal muscle.

Nutrient deficiency cramps are caused by an electrolyte imbalance, resulting from excessive sweat loss, or by deficiencies of vitamins and/or minerals that strengthen and maintain muscle structure. Polymorphic variants in certain genes are associated with a deficit of electrolytes and nutrients. A joint analysis of certain genotypes may indicate whether it is necessary to provide more nutrients, correct hydration regimens or modify rest periods to reduce the chances of developing cramps.

Physical exercise and weight control

Physical activity is beneficial for health and is particularly recommended for people with a greater risk of obesity, as exercise helps to improve metabolism. The combination of regular physical exercise with low calorie diets is the best way to reduce weight. Lipolysis and thermogenesis regulation mechanisms are involuntary in maintaining body weight and certain genotypes are associated with a greater body mass index (BMI) and resistance to weight loss, due to a slower energy metabolism and less mobilisation of fatty acids. Knowing the genetics of markers related to lipolysis and thermogenesis mechanisms can tell us the relationship between weight/body fat and response to sport. The results can help you to choose customised diet and exercise in order to lose and maintain weight. Also, in this category, the FTO gene marker is included, which is associated with a greater tendency of obesity, body mass index increase and waist circumference.

Insulin sensitivity

Insulin is the hormone secreted by the pancreas to control glucose levels in the body. Insulin sensitivity refers to the body's ability to respond to changes in glucose levels. In general, having a greater insulin sensitivity is good and means that the body has a greater ability to process glucose. On the other hand, insulin resistance (high insulin) is a change which impedes the correction regulation of insulin, increases the storage of fat and is a risk factor for obesity and type 2 diabetes. Exercising reduces glucose levels. It has been seen that some genotypes are associated with an increased insulin sensitivity in response to exercise. Knowing your genetic profile associated with insulin sensitivity allows you to better manage and plan aerobic and anaerobic exercise and to adapt your usual diet, paying special attention to carbohydrates.

Genes studied

ACE, ACVR1B, ADAMTS14, ADRB2 , ADRB3 , AGT, AMPD1, APOA1, AQP1, ARHGEF25(GEFT) , BDKRB2, BDNF , CASP8, CCL2, CCR2 , CHRM2, CILP, CKM, COL12A1 , COL1A1, COL5A1, COL6A1, CREB1, CREM, DMD, ELN, EPAS1 (HIF2A), FABP2, FBN2, GABPB1 (NRF2), GALNT13, GDF5 , GNB3, HFE , HIF1A , IGF1, IGF1R, IGF-2, IL15RA, IL1B, INSIG2 , KCNJ11, KIF5B, LIF, MCT1, MMP3 , MSTN , MTHFR, MTR, NFIA-AS2 , NOS3, NRF1, PPARA, PPARD, PPARD , PPARG , PPARGC1A, PPP3CA, PPP3CB, PPP3R1, RBFOX1, SLC2A4, TIMP2 , TNC, TNF , TRHR, TRHR, TTN, UCP2, UCP3, VDR , VEGFA,

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Technology used

Whole genome sequencing (WGS) using Illumina HiSeq X10 or NovaSeq 6000 systems. Illumina PE150, QQ30 ≥80%, aligned with the human reference genome GRCh37/hg19. The classification and analysis of variants is carried out based on the recommendations of the American College of Medical Genetics and Genomics (ACMG). The variants reported are mentioned based on the recommendations of the Human Genome Variation Society (HGVS).

Our report: is the scientific-technical communication of the results. It is written in a precise yet simple manner, intended for both our users and health professionals. It is provided within the framework of a consultation with one of our genetic counsellors. This can take place via videoconference. During the consultation the specialised professional will explain the details, answer any user queries and clear up any doubts that may occur.

Note: the detection of genetic variants only provides a predisposition or potential, but never provides a certainty of developing diseases. Under no circumstances is the genetic information provided valid for diagnostic use. It does not imply the potential to determine the age you will be when it starts nor the type or severity of the disease(s); nor does it allow us to rule out the existence of clinical or genetic heterogeneity.

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