MYGENEHUB

NUTRIFIT

Nutrigenetic analysis

Sample report

ID: 00002

MYGENE**HUB**

Hello there,

we congratulate you on an important step that you have made towards self-discovery. The better you know yourself, the easier you influence your body weight, youthful look, your fitness and health. As the genes are the ones that determine the response of your metabolism and muscles, your personal DNA analysis will allow you to optimise eating habits and exercise routine in order to reach your goals much more easily. We believe that with carefully prepared, personalised recommendations, our experts will justify the trust that you have invested in us.

We are happy to be able to follow you on this exciting journey where you will, with the help of your personal DNA analysis, finally discover how your body functions. The secret to success that your personal DNA analysis will lead you to is hidden in the personalised diet and lifestyle plan, in which all the needs that your genes determine are taken into consideration.

The analysis of your genes is performed according to the highest quality standards. In the first stage, on the basis of relevant scientific literature, we submit the genes to rigorous selection where, among many, we chose only those for which the influence has been proven, and for which there is enough reliable evidence and quality scientific research. We perform the analysis in a laboratory, which operates according to the ISO`s quality standards, where we analyse your DNA using an extremely reliable and most advanced technology. In addition, nutritional experts create expert nutritional and lifestyle recommendations especially for your genetic makeup.

It is precisely our high quality standards that guarantee reliable results of DNA analysis. Or, as the head of the Chair of Pharmaceutical Biology, prof. Borut Štrukelj, M. Pharm., Ph.D., says:

"The personal DNA analysis reveals surprising information which has not been known to us so far. It enables the individual to start eating according to his/her genetic makeup. He/she therefore ingests only what his/her body needs, and, inversely, avoids the nutrients which are, according to his/her genetic makeup, harmful."

prof. Borut Štrukelj, M. Pharm., Ph.D., The Faculty of Pharmacy, University of Ljubljana

We are convinced that your personal DNA analysis will lead you to appropriate eating habits, a healthier lifestyle, a better well-being and, consequently, a better personal appearance. We would like you to know that your personal DNA analysis does not contain any pathological diagnoses, and we recommend that you consult your personal doctor, in case of any bigger changes to your eating habits.

You yourself are the key to final success of your DNA analysis, and we, therefore, advise you to follow the recommendations, and practise them responsibly. You are about to discover surprising information about yourself that will help you make the best of the potential that Mother Nature has given you.

GenePlanet team

CONTENTS

CONTENTS

THE INFLUENCE OF DIET ON BODY WEIGHT

Analysis	Your result	Summary
Response to saturated fats	NORMAL	*The intake of saturated fats is not additionally unfavourable for you. Despite that, your daily intake should not exceed 10% of caloric intake.*
Response to monounsaturated fats	NORMAL	*Your daily intake of monounsaturated fats should be 10% of caloric intake. We recommend you to prefer olive oil when preparing the food.*
Response to polyunsaturated fats	NORMAL	*Polyunsaturated fats should represent 7% of your daily caloric intake. You will find sufficient amounts of them in hazelnuts, almonds, mackerels, etc.*
Response to carbohydrates	UNFAVOURABLE	*Due to your unfavourable response to carbrohydrates, we recommend you to lower their daily intake. Restrict it to 50% of daily caloric intake.*
Satiety	HIGHER TENDENCY	*We suggest that you go food shopping with a full stomach, because this way you'll be more likely to buy only those products that you really need.*
Weight loss-regain	MORE LIKELY TO REGAIN WEIGHT	*If you would like to lose some weight, it is not recommended to starve yourself! Rather develop healthy eating habits which you will be able to follow even after you reach your desired weight.*

LOW CARB DIET

You are advised to eat foods from all food groups, with controlled intake of carbohydrates.

THE REQUIREMENT OF NUTRIENTS

Analysis	Your result	Summary
Vitamin B6	LOW LEVEL	*Eat foods that contain more vitamin B6 (figs, apricots, chicken), to make sure that your daily consumption of vitamin B6 would be 2300 mcg.*
Vitamin B9	LOWER LEVEL	*For you the daily vitamin B9 intake is 500 mcg. We recommend to you fruits (oranges, dried apricots) and vegetables (leek, broad beans, broccoli).*
Vitamin B12	HIGH LEVEL	*Consume 3 mcg of vitamin B12 daily. Include in your menu milk and milk products and occasionally also meat.*
Vitamin D	AVERAGE LEVEL	*For consuming 25 mcg of vitamin D daily, we advise you to consume fish (sardines, mackerel) and dairy products.*

THE REQUIREMENT OF NUTRIENTS

Analysis	Your result	Summary
Iron	LOWER LEVEL	*We recommend to you seeds (pumpkin, sesame), pistachios, cashews and rice bran, that will take care of the daily intake of 15 mg of iron.*
Sodium (salt)	AVERAGE SENSITIVITY	*Eat food, that is poor in sodium – consume less than 1200 mg of sodium daily. To improve the taste of food, use lemon, garlic or mint.*
Potassium	LOWER LEVEL	*We recommend 4000 mg of potassium daily. Fruits (apricots, blueberries), vegetables (leeks, wheat germ), and pistachios are the best sources.*
Vitamin E	AVERAGE LEVEL	*Your daily vitamin E intake should be 14 mg. Lot of vitamin E can be found in wheat germ and its oils, almonds, hazelnuts, tomatoes and broad beans.*

METABOLIC PROPERTIES

Analysis	Your result	Summary
Alcohol metabolism	EFFECTIVE METABOLISM	*Your alcohol metabolism is effective, but we recommend that you would consume it in moderation (up to 1 dl wine or 2 dl beer per day).*
Caffeine metabolism	RAPID METABOLISM	*You are fast caffeine metabolizer, therefore it has little bit less impact on you. Despite that, we do not advise you to drink more than 2 cups of coffee per day.*
Lactose intolerance	EFFECTIVE METABOLISM	*You have an effective lactose metabolism. Consumption of milk and milk products is recommended to you in terms of metabolism of lactose.*
Gluten intolerance	LOW LIKELIHOOD	*Gluten most likely does not impact your metabolism. Your diet should remain as diverse as possible. If experiencing any problems associated with gluten intolerance, try a gluten-free diet.*

SPORTS AND RECREATION

Analysis	Your result	Summary
Muscle structure	GREATER ENDURANCE	*You have durable muscles. We recommend disciplines, such as long distance running, cycling, aerobics, skating, swimming or hiking.*
Strength training	LESS RECOMMENDED	*To built up some muscles without accumulating extra fat we don't recommend heavy weight lifting. Go for workouts, focused on your own weight: e.g. push-ups, sit ups, lifting yourself on a bar.*
Heart capacity	AVERAGE HEART CAPACITY POTENTIAL	*To increase your heart capacity, try to perform very hard exercise for 3-5 minutes, separated by complete recovery between each hard effort.*
Muscle volume gene	LOW MUSCLE VOLUME POTENTIAL	*Your genetic makeup doesn't give you an advantage in terms of muscle volume gain potential compared to the individuals with one or two A copies of IL15RA present.*

LIFESTYLE

Analysis	Your result	Summary
Biological ageing	SLOWER AGEING	*You age slower compared to others. Be careful with unhealthy bad habits (smoking, alcohol, overeating) so you wouldn't worsen your state.*
Inflamation sensitivity	LOWER SENSITIVITY	*To ensure a lower level of inflammation, include antioxidants and other anti-inflammatory foods in your diet. For example, dark green vegetables, dark chocolate, garlic, walnuts, ginger or salmon.*

CARDIOVASCULAR HEALTH

Analysis	Your result	Summary
Omega-3 metabolism	SLIGHTLY INCREASED RISK OF DEFICIENCY	*We recommend that you include salmon, tuna or sardines, which are high in EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) types of omega-3 fatty acids.*
Omega-3 and triglycerides	MORE EFFICIENT	*Your genes determine that a diet rich in omega-3 fatty acids may be a very efficient strategy in lowering your triglycerides. In case of high triglycerides, think about including more omega-3 in your diet.*
Insulin sensitivity	AVERAGE SENSITIVITY	*Include foods rich in fibre - especially those with soluble fibre, such as legumes, oatmeal, flaxseeds, brussels sprouts and oranges.*
Adiponectin	AVERAGE LEVEL	*Your genes determine average production of adiponectin. Adiponectin level also depends on body weight, therefore keeping BMI under 25 units should be one of the most important long-term goals.*

For a better understanding of your personal DNA analysis, we would like you to read the following instructions.

Index and an overview of analyses with your advice

A user-friendly index enables you an easy and fast review of all the analyses. In addition, the index itself already contains the results of the analyses, which show the features (nutrients, lifestyle factors) that you have to pay attention to, based on your genes.

The Index is followed by "An overview of analyses with your advice", which features the most important findings and key recommendations for each section separately. A comprehensive summary of recommendations enables you to quickly and easily focus only on the factors that are the most important for you.

Sections and analyses

Your personal DNA analysis contains 6 sections which thematically capture the key elements of your diet and lifestyle. Every section starts with a summary of results, which is followed by an introduction to the subject of analyses for enabling us an easy interpretation of results.

An individual analysis contains an explanation of scientific research and the analysed genes with the mutations within these genes. Every analysis contains a genetic result and appropriate nutritional and lifestyle recommendations. More detailed explanations of larger analyses can be found at the end of your personal DNA analysis, in the chapter "More about analyses".

1. SECTION THE INFLUENCE OF DIET ON BODY WEIGHT
2. SECTION THE REQUIREMENT OF NUTRIENTS
3. SECTION METABOLIC PROPERTIES
4. SECTION SPORTS AND RECREATION
5. SECTION LIFESTYLE
6. SECTION CARDIOVASCULAR HEALTH

Results of your personal DNA analysis

For a better understanding, your results are presented in a colour scheme, where each colour has a specific meaning:

- **Dark green** | *Your result is the most optimal; the state simply needs to be maintained.*
- **Light green** | *Your result is not completely optimal; the state can be improved.*
- **Yellow** | *Your result is average. If you follow the recommendations, you can do plenty to improve your state.*
- **Orange** | *Your result is not favourable. For an optimal state we recommend action.*
- **Red** | *Your result is the least favourable; pay close attention to these analyses.*
- **Grey** | *Your result is neutral - it defines neither a positive nor a negative status.*

The analysed genes

A list of analysed genes is added to each analysis, and each gene has a determined genotype. A genotype or the combination of genotypes within an analysis determines your result. More information on the analysed genes is at the end of your personal DNA analysis, where it is presented in a chart with short descriptions of genes.

Recommendations of your personal DNA analysis

Based on your genetic makeup, we have prepared recommendations, which reveal your daily needs in terms of nutrients and guide you into a lifestyle suitable for you. We advise you to act on them, as they consider the needs of your body which are determined by your genes, and which, therefore, have a large influence on your current state and well-being.

Nutrition charts

The last pages of your DNA analysis consist of nutrition charts, which will help you to follow our recommendations. Information on the caloric value and the amount of vitamins, minerals and macronutrients is presented for every food item. This enables you to optimally plan your meals, because you can comprehensively follow all the nutrients that are present in a specific food item.

Legal liability

Your personal DNA analysis is predominantly of educational nature. Its purpose is not to give medical advice for determining diagnoses, treatment, alleviation or prevention of illnesses. Therefore, if you have any serious medical problems, we do not recommend any nutritional changes prior to consulting your personal doctor. Under no condition should you change your medications or any other medical care without the permission of your doctor. For any questions, concerning your personal DNA analysis contact us by email: **support.en@geneplanet.com**.

Genes and genetic mutations

Genes are areas of the DNA chain which carry instructions for the synthesis of proteins. Every gene carries a specific combination of nucleotides marked with letters A, T, C and G, where an individual combination determines a specific protein. Sometimes a mutation (or an error) occurs in the process of DNA replication, and the nucleotide sequence is not adequate (genetic mutation). This results into incorrect functioning of the protein.

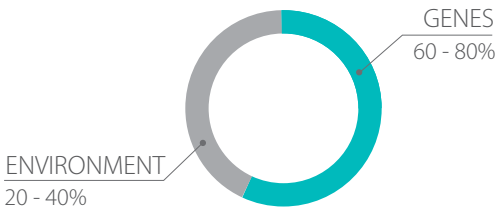
When doing a personal DNA analysis we analyse several sites (loci) of your DNA where mutations can occur. The type of mutation at this locus of DNA is called the genotype. If there is a possibility of substitution at a specific locus of DNA from C to T we have 3 possible genotypes: CC, CT or TT. This happens, because we inherit the DNA from our mother, as well as our father, and we therefore have every gene present in two copies. It is, therefore, possible for a mutation to occur only in one copy of the gene, in both copies, or not to occur at all.

It is clear that various genotypes are one of the most important factors which make people different: we have different eye colour, different skin, talents, we are differently susceptible to illnesses, and we have completely unique eating habits.

Heritability

In all of the analyses where this information is known, "heritability" is shown. It is a measure that we use to determine how much our genes influence the formation of a certain characteristic. The bigger the heritability is, the greater influence our genes have, and the lower influence the environment has.

One of the characteristics is the body height of the individual, where genetic factors contribute from 60 to 80 percent, while the environmental impact on the development of body height is between 20 and 40 percent.



Nutrigenetics – the needs of our body are unique

Nutrigenetics represents a field which focuses on consequences of those genetic mutations that can be regulated with a diet. It is based on vast scientific studies which connect specific genetic mutations of individuals with different eating habits. The objective of nutrigenetics is to recognise **specific characteristics of an individual based** on which the diet can be optimised. Nutrigenetics, of course, is not part of the alternative medicine, and it is not a form of treatment. It is not an approach which would include modifying of the DNA, and it does not determine an optimal diet based on blood type or any other phenotypical characteristics of a person.

A personalised nutrition – the basis for optimal diet

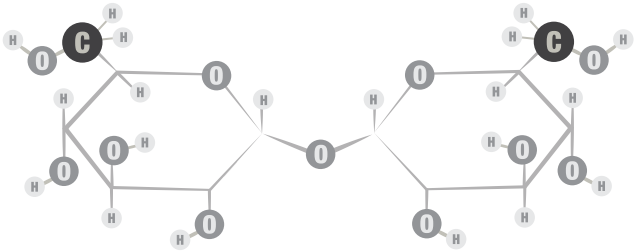
Although 99 percent of our genetic makeup is completely identical, there are approximately ten million genetic variations among individuals. In accordance to this, the nutritional needs of every individual are very specific. Unique needs of every individual are subject of a new branch of nutrigenetics – personalised nutrition. **A personalised nutritional approach** is essential and absolutely necessary for an optimal diet, in the same way as your personal doctor, who knows you, is necessary for ensuring your health. Diet is also one of the factors that we can use to influence our body and at the same time a factor that can most easily be influenced.

An optimal diet – the key to health and happiness

An optimal diet is an adjusted way of eating which can help us reach an **optimal functioning of our body**, as well as a long and healthy life. When our diet is optimal, we are emotionally more stable, physically active and we have significantly less health problems.
By following our recommendations and with a consistent use of "Nutrition charts", you now have a unique opportunity to step on a path of an optimal diet. You will see that food items in the charts are organised according to their importance. They, therefore, represent a great resource that enables you to choose a food combination which ensures your body a sufficient amount of nutrients. We recommend that you try to place different food items from different food groups on your menu.

Learn about the main ingredients of diet and the significance of analysed vitamins and minerals

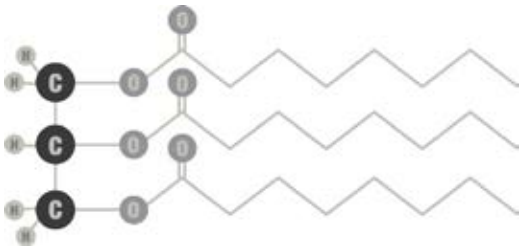
Carbohydrates are the first group of macronutrients which represent the most important role in our diet, regardless the type of diet. According to their chemical structure, we divide them into simple and complex ones. **Simple carbohydrates** are naturally present in fruits, and their main property is that they are digested very quickly. **Complex or compound carbohydrates** are longer chains compounded of simple carbohydrates which have to be broken down during digestion. Only then can our body use them. Because of this quality, they represent a long-term source of energy for the body. The highest amount of complex carbohydrates is present in vegetables, legumes, and cereal products (flakes, bran). These food sources, including fruits, contain extremely beneficial substances for our body, called **fibres**. As a source of energy, they are useless to our body, as it cannot digest them, but they are important for regulating digestion and blood sugar levels, as well as cholesterol levels. Although fruits contain mainly simple carbohydrates, their content is low. Additionally, fibres ensure that fruits would have little impact on blood sugar levels. This is why fruits are much healthier than sweets.



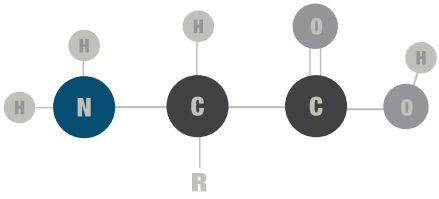
A system called **glycemic index** has been established for evaluating a food item on the basis of its influence on the increase of blood sugar level. This system arranges foods into classes with values from 0 to 100, according to how quickly they increase blood sugar level in comparison to pure glucose. For example, white bread is a food item with a high glycemic index, and it causes a rapid increase of blood sugar. Unrefined cereals have a low glycemic index, the body digests them slower, and they cause a steady increase of blood sugar. But there is a downside to classification of foods according to the glycemic index, because it does not consider the actual amounts of carbohydrates in food. Because of this, a new system has been established, called **the glycemic load**, which enables us to classify food items more realistically, according to the criterion of blood sugar increase. This is why, for example, carrots have a high glycemic index, but a very low glycemic load. The reason for this is that carrots contain simple sugars, which strongly influence the increase of blood sugar. But, if we consider that the percentage of sugars in carrots is very low, we notice that carrots are actually very beneficial to our body and are highly recommended for diabetics.

Fats represent the next group of nutrients, which are known for their high energy content. They are predominantly important for digesting fat-soluble vitamins A, D, E and K, the synthesis of certain hormones, and are the component of cellular membranes. They are essentially divided into saturated and unsaturated fats. The latter are found in fish, nuts, seeds, and oils extracted

from them. They are recognised by the fact that at room temperature, as opposed to saturated fats, they are in liquid state. Unsaturated fats are further divided into poly- and monounsaturated. Both groups are extremely important for our body. However, polyunsaturated fats are the only ones that our body cannot produce, and it is therefore essential for us to get them from food. This is why they are called essential fats. Among these are omega-3 and omega-6 fatty acids. Omega-9 fatty acids are classified under monounsaturated fats, and they are naturally found mostly in olive oil. Despite the fact that monounsaturated fats are extremely beneficial for us (they reduce LDL and increase HDL cholesterol), they have one disadvantage. They are less resistant to high temperatures, and if they are overly reheated, so called trans saturated fats are formed, which are even worse for our body than saturated ones. It is better to cook on low temperatures or use coconut and palm oil, which contain mostly saturated fats.



Proteins represent the last group of **macronutrients**. They are absolutely necessary for our body, since they are the main structural component of our body. There are a lot of them in meat and meat products. This type of food should be in a minority on our plate, in comparison to other macronutrients, and we recommend you to choose very lean meat. There are also a lot of proteins in milk and dairy products, which, in addition, represent a great source of calcium, but we recommend you to opt for those with low fat content. Good substitutes for animal proteins are soy and soy products. These are especially well known among vegetarians. You may not have known this, but a great source of proteins are also nuts, seeds and cereals.



Carbohydrates, fats and proteins, which are **macronutrients**, represent a major part of our diet. However, vitamins and minerals, also called micronutrients, are also of great importance in our diet. Very small amounts are needed for a normal functioning of our body. Even though they do not have any energy content, they are very important for our body. They participate in antioxidative processes, cell-renewal processes and numerous enzyme reactions. They can be found in various foods, and we recommend you to use the nutrition chart for information on a specific vitamin or mineral. We especially recommend eating diverse food, which would help you to fulfil your requirements for micronutrients and macronutrients.

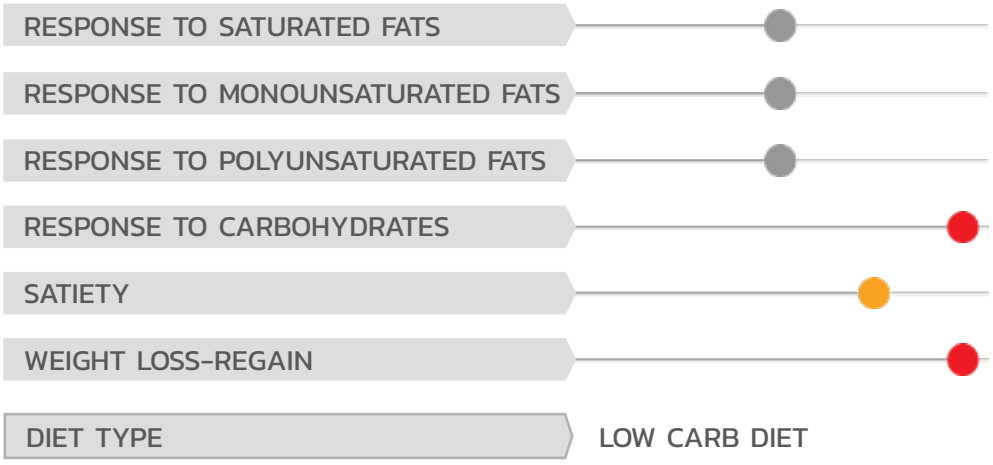
WAY TO YOUR IDEAL BODY WEIGHT

ADJUST YOUR DIET ACCORDING TO YOUR GENES

Our health is directly related to our diet and eating habits. On one hand, there is a characteristic excessive calorie intake which results in weight-gain, and on the other, there is unhealthy dieting with crash diets which do not have the right effect.

In this chapter you will learn how your genetic makeup influences the felling of insatiety, weight loss-regain and how your body responds to different types of fats and carbohydrates. At the end of the chapter we reveal "A diet type" that according to your genetic makeup suits you the best.

We advise you to follow our recommendations because the balance between the intake and the use of calories, physical activity and genetic background is the key to optimal body weight and well-being. It is generally not recommended to eat more calories than are actually burned. In addition to a controlled calorie intake, the right choice of foods is also crucial, as certain foods can cause even more harm, while other foods can improve your condition. The fact, that a diet based on genetic analysis is truly effective, has been proven by scientific research performed at Stanford University. The study discovered that people who had been eating according to their genetic makeup had lost 4 kilograms more that those who had been trying to lose weight in no accordance with their genetics.



RESPONSE TO SATURATED FATS

Saturated fats are found mostly in food of animal origin. Our body uses them as a source of energy, but, unfortunately, in connection to the genetic makeup, they also have the property of increasing the risk for becoming overweight. Scientists have discovered from a 20 yearlong study, a gene that causes some people gain weight quicker due to saturated fats than others. They discovered that the saturated fats have even more negative effect on people with unfavourable variant of **gene APOA2**. In case of excessive consumption of saturated fats, they have twice as high risk for becoming overweight, compared to carriers of the common variant of the gene. Despite this fact, people with a risk variant of gene APOA2 do not need to worry: by reducing the saturated fat intake, they can lower their BMI by 4kg/m2. Such differences have occurred between people with an unfavourable variant of the gene who have consumed normal amounts of saturated fats and those who have appropriately limited their intake.

YOUR RESULT:

NORMAL RESPONSE

One of your chromosomes carries a common copy of the gene APOA2 and the other, a rare copy of the gene. Saturated fats, therefore, do not have a negative influence on you. Approximately 48 percent of people in the population have such a genetic makeup, as you have.

Recommendations:

- Your genetic makeup determines that saturated fats are not additionally unfavourable for you.
- Your daily intake of saturated fats can be slightly higher than for people with an unfavourable variant of the gene; therefore you will follow your daily intake recommendations more easily.
- We recommend that you closely follow your diet recommendations at the end of the chapter, which take into account your response to saturated fats.
- When planning your menu, we suggest you to use the nutrition charts, to make following our recommendations easier.

WHY WE NEED THEM
source of energy for the body

CAN OUR BODY PRODUCE THEM
yes

THEIR INFLUENCE
increase LDL, slightly increase HDL

THEIR ADVANTAGE
more suitable for preparation of hot meals – do not form trans fats

WHERE ARE THEY FOUND
animal meat, milk and dairy products, coconut and palm oil

Saturated fats affect the transport of calcium, therefore it is not surprising that they are present in maternal milk. They are extremely important for our body, but the problem is their large representation in products of animal origin that can quickly lead to their excess amount.

RESPONSE TO MONOUNSATURATED FATS

Monounsaturated fats, just like saturated fats, are non-essential – they are not necessary for survival, because our body knows how to produce them. However, they are very beneficial for our organism, because they visibly influence the increase of good HDL cholesterol, and simultaneously reduce the level of triglycerides and LDL, or weaken cholesterol. In addition, it has been proven that they reduce the risk for becoming overweight. Their increased consumption can, therefore, be very beneficial, especially, if we are the carriers of a certain variant of a gene. It has been discovered that people with a favourable variant of the **ADIPOQ gene** can efficiently reduce their body weight with a sufficient intake of these fats. The sufficient intake of monounsaturated fats has enabled the carriers of favourable variant of the ADIPOQ gene an approximately 1.5kg/m2 lower BMI. Therefore, if you are the carrier of a favourable variant of the ADIPOQ gene, a slightly higher intake of monounsaturated fats, which will favourably influence your body weight, is recommended.

YOUR RESULT:

NORMAL RESPONSE

The analysis has shown that you are a carrier of a genetic makeup which determines a normal benefit of monounsaturated fats for your organism.

Recommendations:

- Although you respond normally to monounsaturated fats, this does not mean that they are not important for your health.
- Monounsaturated fats, together with polyunsaturated fats, reduce the levels of LDL cholesterol and triglycerides, and increase the level of HDL cholesterol. This is why foods with a higher amount of unsaturated fats are known as generally healthy.
- A great source of monounsaturated fats are olives, avocado, hazelnuts, macadamia nuts and cashews, which can be added to many dishes, or can be used for making delicious spreads.
- You can find detailed advice concerning the recommended daily intake of monounsaturated fats in your diet plan, so we recommend that you follow it.

Among monounsaturated fats, oleic acid (largely present in olive oil) is particularly beneficial for our health. Olive oil contains also many antioxidants and its use can protect you even against cardiovascular disease.

WHY WE NEED THEM
source of energy, growth, development, functioning of the heart and nervous system

CAN OUR BODY PRODUCE THEM
yes

THEIR INFLUENCE
visibly reduce LDL and triglycerides and increase HDL

THEIR DISADVANTAGE
less suitable for preparing hot meals – form trans fats

WHERE ARE THEY FOUND
almonds, hazelnuts, walnuts, cashews, seeds, olive oil

RESPONSE TO POLYUNSATURATED FATS

Polyunsaturated fats are, unlike saturated and monounsaturated fats, essential for our body – our body desperately needs to get them from food, as it cannot produce them. They are vital for a healthy heart and brain function, as well as our growth and development. The most important are the groups of omega-3 and omega-6 fatty acids, whose ratio in our diet should be 1:5; but in a modern-day person, the ratio of omega-6 fatty acids is increasing, which is not very healthy. Even though polyunsaturated fats are very beneficial for our body, they have an even more positive effect for some people.

In a research study on which our analysis is based, it has been discovered that a certain variant of the **gene PPAR-alpha** can determine the relationship between polyunsaturated fats and triglycerides in the blood. It has been proven that people with a risk variant of the gene, and with an inappropriate intake of polyunsaturated fats, have a 20 percent higher triglyceride level compared to other people. And this can have an unfavourable effect on your health. High intake of polyunsaturated fats has completely levelled out these differences, and it is therefore so much more important for people with a risk variant of the gene to adjust their diet and increase the intake of polyunsaturated fats.

YOUR RESULT:

NORMAL RESPONSE

You are the carrier of two common copies of the gene PPAR-alpha, which causes you to perfectly normally respond to polyunsaturated fats.

Recommendations:

- Your genetic makeup determines that you perfectly normally respond to polyunsaturated fats. Nevertheless, do not forget about them because they are very beneficial for your health (they help burn body fat).
- The most important are predominantly omega-3 fatty acids, which are many times overshadowed by omega-6 fatty acids. We advise that their ratio should not be higher than 1:5.
- They can be found in many nuts, seeds and fish; for example, in flax seed and salmon.
- Carefully follow your diet plan revealed to you at the end of the chapter. In it, you will find many instructions. You will also learn which daily intake of polyunsaturated fats is the most suitable for you.
- We recommend you to use nutrition charts, which will enable you to optimally follow our recommendations.

Did you know that despite the fat abundance of a typical diet, we are mostly suffering a fat deficiency? We are lacking polyunsaturated fats that are essential for adequate functioning of our cells. A simple way to improve this deficiency is to consume mustard oil, which has a high content of polyunsaturated fats.

WHY WE NEED THEM
source of energy, growth, development, the functioning of the heart and nervous system

CAN OUR BODY PRODUCE THEM
no

THEIR INFLUENCE
visibly reduce LDL and triglycerides and increase HDL

THEIR DISADVANTAGE
less suitable for preparation of hot meals – non-resistant to heat

WHERE ARE THEY FOUND
rapeseed oil, corn, flaxseed oil, pumpkin seed oil, fish oil and fish, spinach, peanuts

RESPONSE TO CARBOHYDRATES

Carbohydrates are the most basic source of energy needed for physical activity of our body. Because of their taste, we sometimes call them sugars. Various diets have a very different attitude towards them: some diets are based on carbohydrates, while other recommend limiting them. Yet other ones recommend that we consume them separate from proteins and fats. Of course, such diets are not successful with all people, because they do not consider your genetic makeup. We, however, have done precisely that.

We have analysed the **genes FTO and KCTD10**, which determine the influence carbohydrates will have on your body. It has been discovered that people with a risk variant of the FTO gene, in case they do not consume enough carbohydrates, are 3-times more susceptible to becoming overweight, compared to people who are carriers of two common variants of the FTO gene. With an adjusted intake of carbohydrates, they can considerably eliminate this risk. On the other hand, the gene KCTD10 determines the relationship between the intake of carbohydrates and the HDL cholesterol level and with an inappropriate intake and a risk variant of the mentioned gene, the HDL cholesterol level can rapidly decrease.

YOUR RESULT:

UNFAVOURABLE RESPONSE

Your DNA analysis has shown that you are the carrier of two unfavourable copies of the KCTD10 gene, which determines that your body has an unfavourable respond to carbohydrates.

Recommendations:

- Despite your unfavourable genetic makeup, there is no need to worry. It is only important that you limit your daily intake of carbohydrates.
- One of the effective ways to reduce your daily intake of carbohydrates is to prepare unseasoned boiled potatoes instead of whole grain rice – potatoes have fewer carbohydrates, which is surprising, but true.
- More detailed information concerning your optimal diet can be found at the end of the chapter, in your diet plan. In it you will also find all the information needed for preparing an optimal menu.
- For an easier and more effective preparation of menus we recommend a consistent use of nutrition charts.

Apples, oranges and apricots after a meal can be a reason for discomfort. They contain the substance pectin that bounds water and swells. With some people it can lead to feeling bloated or belching.

WHY WE NEED THEM
source of energy, bone- and cartilage-building

DEPRIVATION
decrease of body and muscle mass, malnourishment, bad mood

WHERE CAN THEY BE FOUND
cereal products (bread, cereals, pasta), vegetables, fruit

SATIETY

Satiety can be described as the feeling of a full stomach after a meal, while hunger is the feeling of the need for food. Scientists have discovered the link between the feeling of satiety and the **gene FTO**. This is a gene known to influence the individual's body weight (possibly through the detection of satiety). It has been proven in the scientific research that the carriers of one unfavourable copy of the FTO gene reach the feeling of satiety two times harder, while the probability of carriers of two unfavourable copies of the gene to reach the feeling of satiety is four times smaller compared to people with two favourable copies. People who find it harder to reach the feeling of satiety usually eat more, than those with a normal feeling of satiety and often without reaching the desired feeling.

YOUR RESULT: HIGHER TENDENCY FOR INSATIETY

You are the carrier of one favourable and one unfavourable copy of the FTO gene, which determines that you reach the feeling of satiety 2-times harder.

Recommendations:

- Your genetic makeup determines that you reach the feeling of satiety harder. Stick to the following recommendations, which will help you increase the probability that you will feel full after a meal.
- We recommend that you often eat foods such as lentils, peas, brown rice, oat bran, carrots, plums, grapefruits, almonds and peanuts. Such foods contain a lot of fibres which will give you the feeling of satiety.
- When buying wheat foods, vegetables and packed dried fruits read the food labels and check how many fibres a certain product contains.
- Drink water before meals, as it reduces the free space in your stomach available for food, and this will make you feel full more easily.

An uncontrollable desire for food despite a full stomach shows that actually you're not hungry. For many people food represents solace and situations of emotional instability, stress and boredom often trigger the desire for food.

WEIGHT LOSS–REGAIN

Weight loss-regain can be a never-ending cycle. Statistics shows that about 80 percent of people who lose weight regain their kilos after one year. There are mainly two reasons why this happens:
1) people choose restrictive short-term diets, which are hard to follow in the long-term;
2) most people lose their motivation to continue with the diet after achieving their goals. However, there's another reason; namely, tendency to gain weight back has also a genetic background.

The **ADIPOQ gene** has various functions, among which is its influence on our successful weight loss. Studies have shown that people with at least one rare copy of the ADIPOQ gene are more likely to be successful in avoiding the so-called yo-yo effect after weight loss. About 20 percent of people worldwide have such a genetic makeup. Conversely, about 80 percent of the population have the common GG genotype and need to put more effort into maintaining weight after weight-loss.

YOUR RESULT:

MORE LIKELY TO GAIN WEIGHT BACK

The analysis of you DNA has shown that you are more likely to regain weight after losing it.

Recommendations:

- Your genes determine that it's more likely that you will regain your body weight after losing it.
- Bear in mind that this doesn't mean that you can't succeed in maintaining it.
- But don't make the most common mistake: if you decide to lose weight, don't starve yourself!
- It is important that you develop healthy eating habits which you will be able to follow even after you have reached your desired weight.

It is recommended to monitor your body weight once a week. Since weight naturally varies throughout the week, researchers have found that Wednesday weigh-ins are somehow the most accurate.

DIET TYPE

It is much easier to tell what is unhealthy in general for all of us, than to answer the question about what type of diet is most suitable for an individual. The reason for this is the genetic makeup, which determines the suitability of a specific diet plan for our body. This is precisely why one diet can be very successful for one person, but does not work for someone else, or it can even have a negative effect.

The diet that we recommend is not merely coincidental, but it is based on your genetic makeup. The diet based on your personal DNA analysis considers your individual characteristics and allows you to eat what your body truly needs.

YOUR RESULT:

LOW CARB DIET

We recommend you to choose diverse food from different food groups, but pay attention to control your carbohydrate intake. Be careful when you consume them, because an excessive intake has a negative effect on your health.

Your daily caloric intake, which is in accordance with your genetic profile, is presented in the chart below. Genes, namely, regulate the amount of energy that your body uses in resting, and this is why we were able to adapt our recommendations according to your genetic makeup. Do not forget to consider your daily physical activities, as the calorie consumption increases with physical activity, and it decreases on your less active days.

An optimal daily calorie intake:

Age	Exclusively sitting Activity with little activity in free time	An occasionally higher use of energy for walking and standing activities	Regular moderate physical activity	Intensive physical activity
	kcal/day	kcal/day	kcal/day	kcal/day
14 to 19	**2236**	**2751**	**3267**	**3611**
20 to 25	**2187**	**2692**	**3197**	**3533**
26 to 51	**2042**	**2514**	**2985**	**3299**
52 to 65	**1867**	**2297**	**2728**	**3015**
over 66	**1766**	**2173**	**2581**	**2852**

With the help of **genetic analysis**, we have also determined the percentage of daily calorie intake represented by saturated, monounsaturated and polyunsaturated fats, carbohydrates and proteins. The calories can be easily transformed into grams by using the following method:

- 1 gram of protein or carbohydrates is 4 kcal
- 1 gram of fat is 9 kcal

Example: 10 percent of monounsaturated fats in a daily intake of 2000 kcal is 200 kcal, which is approximately 22 grams (200/9) of monounsaturated fats.

Your recommended daily percentages of basic nutrients:

Nutrient	Your response	Daily intake (%)
Saturated fatty acids	**NORMAL**	**10**
Polyunsaturated fatty acids	**NORMAL**	**7**
Monounsaturated fatty acids	**NORMAL**	**10**
Carbohydrates	**UNFAVOURABLE**	**48-50**
Proteins		**23-25**

Recommendations:

MEAT AND FISH

You shouldn't opt for meat more than 4-times a week. Instead of beef and pork, try to opt for turkey meat more often, as it is healthier.

Choose lean parts of meat and meat products which are prepared out of whole chunks.

If you are vegetarian, you will successfully replace animal proteins with soy foods such as tofu or soy burgers.

Fish should be on your menu at least once a week. We recommend sea bass, sardines, mackerels or tuna.

MILK AND DAIRY PRODUCTS

Drink a glass of milk, or eat yoghurt every day. Yoghurt contains probiotic bacteria which regulate our digestion.

Have a whole wheat bun with your yoghurt or add it to your favourite cereal.

Spread a spoonful of cottage cheese on a slice of bread or eat it with two slices of low-fat cheese.

Every now and then, prepare yourself milk rice or similar milk dishes (milk millet porridge, milk semolina).

OILS, NUTS AND SEEDS

When preparing food, do not exaggerate with oil. Add only a necessary amount of it. We recommend walnut oil, virgin olive oil or sunflower oil.

Every day, eat, for example, a large spoonful of ground flaxseeds and a spoonful of pumpkin seeds. You can sprinkle them over salads and pasta, or mix them with yoghurt.

From nuts and seeds we especially recommend sesame seeds and Brazilian nuts, which will enrich you dishes.

LEGUMES, VEGETABLES AND STARCHY FOODS

Your diet should consist mainly of complex carbohydrates. We recommend that you eat enough legumes and other vegetables. If possible, use them with every main course.

The most appropriate for you are peas, broad beans, chick peas, barley, leek, kohlrabi, cauliflower, mangold, lamb's lettuce, lentils and dandelion.

These foods contain fibres, which will lead to an early satiety feeling and you will, consequently, eat less carbohydrates.

Prepare them as salads or side dishes, but they can also represent your main course.

We also recommend porridge dishes made of spelt or barley. Mix one ladle of such porridge with mushrooms or cooked vegetables.

If your meal consists of rice, potatoes or pasta, do not eat bread with it. Also eat as little bread as possible with salads prepared out of legumes.

Other sources of carbohydrates should include unmilled rice, whole wheat or black bread, bran, kale, fennel, leek and mangold.

FRUITS

Throughout the day, eat at least two of the following fruit items: a handful of raspberries, blueberries, black currant, strawberries, a pear or an apple.

GENERAL RECOMMENDATIONS

Eat at least 5 meals a day: breakfast, morning snack, lunch, afternoon snack and dinner.

Opt for fresh and unprocessed foods. Pre-prepared food contains a lot of unhealthy additives.

Avoid frying. Stewing in own juice or boiling is definitely more recommendable.

In general, avoid adding sugar and instead of fruit yoghurt, opt of a regular one.

Instead of soft drinks and other sweetened beverages drink water, as it has no calories.

Replace white bread with whole wheat bread, and white pasta with dark pasta.

Try to avoid various sweet treats such as pastry, candies, ice-cream and artificial soft drinks, because they can quickly be in excess, and they also, in most cases, contain refined, white sugar.

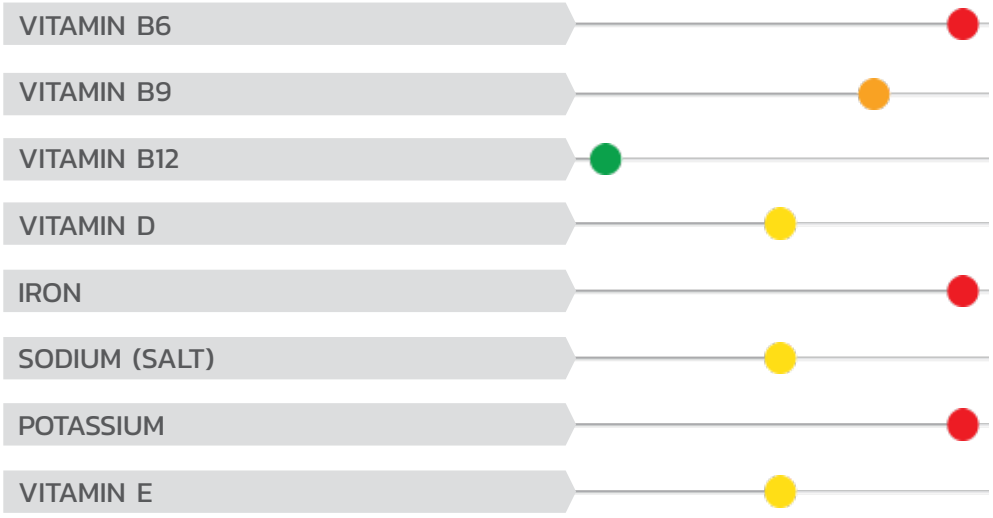
If you find it hard to resist white bread and various bagels we have some advice for you: half the amount by, for example, slicing the bread so that the slice is thinner.

WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

MICRONUTRIENTS PLAY AN IMPORTANT PART IN YOUR HEALTH

Micronutrients, which include vitamins and minerals, are vital for our health. They are essential for the functioning of our organism; they improve our well-being and prevent many diseases. Their daily requirements are determined by numerous factors, and among them is also our genetic makeup. It determines which vitamins and minerals we have to consume in an increased amount, or vice versa, and which of them we have in sufficient amounts and we simply have to maintain their levels. We can get almost all of the vitamins and minerals with regular food. However, this can be slightly more difficult in case we are prone to the lack of them. In such cases, food supplements are a good option.

In this chapter, we will reveal to you what levels of vitamin B complex, vitamin D and E and also minerals, such as iron and potassium, are determined by your genes. In addition, you will also learn how sensitive you are to kitchen salt or sodium. The latter can be specifically adjusted with an appropriate intake of vitamins and minerals.



VITAMIN B6

Vitamin B6, also known as pyridoxine, has numerous functions which are extremely important for our health. More than 100 enzymes, involved in the metabolism of fats, need it for their function, and it is crucial for red blood cell metabolism and for the functioning of the nervous and immune system. All of this confirms its key role in achieving optimal health. Some people are genetically prone to having a lower level of vitamin B6 in their body, which also, among other things, depends on the variant of the ALPL gene. In the study, on which this analysis is based, people with an unfavourable copy of the **ALPL gene** had an approximately 20 percent lower level of vitamin B6. People with two unfavourable copies of the gene ALPL gene had, in comparison to people with two copies of favourable genes, up to a 40 percent lower level of vitamin B6. The reason for such differences is less effective absorption of vitamin B6 in people with an unfavourable variant of the ALPL gene. As a result they have a higher requirement of vitamin B6.

YOUR RESULT:

LOW LEVEL

You are the carrier of two unfavourable copies of the ALPL gene, which determines a 40 percent lower level of vitamin B6. Approximately 25 percent of people have such a genetic makeup.

Recommendations:

- Your genetic makeup determines a less efficient absorption of vitamin B6 and we advise you to increase its intake. It is recommended that you consume on average 2300 mcg of vitamin B6 per day.
- It might look almost impossible to fulfil these requirements, but it is not so. With the help of nutrition charts you will see that vitamin B6 is found in almost all of the foods, so we believe that you will succeed in following our recommendations.
- The highest amount of vitamin B6 is found in chicken liver, sardines, avocado, dried figs and apricots, walnuts, pistachios and garlic.
- We also recommend foods that contain magnesium, as it improves the absorption of vitamin B6. Good sources of magnesium are pumpkin seeds, peanuts, walnuts and hazelnuts.
- Vitamin B6 is the main component of B-complex preparations, which you can use on days when you do not fulfil your daily vitamin B6 requirements with regular food.

Vitamin B6 is also called pyridoxine, but not always has it been called this way. In 1936, when it was discovered, was its name a synonym for "anti-dermatitis factor", since scientists revealed that it can cure the skin disease dermatitis. Vitamin B6 is still used today for different types of skin infections.

WHY WE NEED IT
fat metabolism, appropriate functioning of the nervous system, a healthy skin

EFFECTS OF THE LACK
muscle cramps, disruption in the functioning of the nervous system, skin changes

WHERE IS IT FOUND
yeast, liver, legumes, fish, whole heat cereal

VITAMIN B9

Vitamin B9, also known as folate, or folic acid, is a water-soluble vitamin, which is crucial for an adequate metabolism (an essential component of enzymes), healthy blood, DNA synthesis, and it is also an important factor which reduces the risk of cardiovascular disease.

One of the best-known and most important enzymes, which ensure an appropriate B9 vitamin level, is **MTHFR**. A mutation can occur within the gene that determines this enzyme. This can greatly influence the vitamin B9 level, which has been confirmed by many studies. MTHFR enzyme is sensitive to temperature and thus less active in people who are carriers of an unfavourable variant of the gene, resulting in lower vitamin B9 level. It has been discovered that every unfavourable copy of the MTHFR gene markedly reduces the vitamin B9 level. In case you are the carrier of one of the unfavourable copies of the gene, it is highly recommended that you adjust your diet to achieve optimal health.

YOUR RESULT:

LOWER LEVEL

You are the carrier of one favourable and one unfavourable copy of the MTHFR gene, and your enzyme activity is, consequently, 40 percent lower, which determines a lower vitamin B9 level. Approximately 43 percent of people have such a genetic makeup.

Recommendations:

- You have a less favourable genetic makeup which determines a lower vitamin B9 level. However, there is no need for worry, because you can significantly contribute to your final state by choosing foods which contain slightly higher amounts of vitamin B9.
- We recommend that, with the help of nutrition charts, you prepare meals which will enable you to consume 500 mcg of vitamin B9 per day.
- High amounts of vitamin B9 can be found in fruits (dried apricots, apples, oranges, melons, kiwi) and vegetables (lentils, carrots, sauerkraut, leek, broad beans, broccoli).
- For example, have some fresh orange juice in the morning, and include leek soup in your lunch.

Vitamin B9 is called also folic acid. The name is a derivative of the Latin word folium, meaning leaf. No wonder, since Vitamin B9 is mostly found in leafy vegetables. The consumption of leafy vegetables is highly advisable because our body cannot produce folic acid.

WHY WE NEED IT
red blood cell maturation, DNA and RNA synthesis

THE EFFECTS OF THE LACK
the reduction in number of blood cells

WHERE IS IT FOUND
green leafy vegetables, fruit, beer yeast

VITAMIN B12

Vitamin B12, also known as cobalamin, has a central role in the functioning of the entire nervous system, which is important especially for cognitive abilities. Vitamin B12 is involved in the synthesis of DNA and red blood cells, as well as the synthesis of fatty acids. Vitamin B12 blood level below 200pg/ml indicates its lack. A healthy diet gives the body sufficient amounts of vitamin B12. The lack of it, however, is common in vegetarians, vegans, older people and people who are genetically prone to the lack of vitamin B12.

Numerous studies have confirmed the influence of **gene FUT2** and its mutation on vitamin B12 level. The research that we rely on has proven that every unfavourable copy of the FUT2 gene reduces the level of vitamin B12 level by 10 percent. As a consequence, people with the least favourable genetic makeup have a 20 percent lower vitamin B12 level.

YOUR RESULT:

HIGH LEVEL

You have common copies of the FUT2 gene present on both of your chromosomes which determines a high vitamin B12 level. Studies have shown that people with your genetic makeup have 10 to 20 percent more vitamin B12, compared to others.

Recommendations:

- Your result of the analysis is favourable, and we recommend that you simply maintain your vitamin B12 level.
- We recommend that you consume 3 mcg of vitamin B12 per day.
- If you include milk, dairy products and, occasionally, some meat into your menu, you will not have to worry about experiencing lack of vitamin B12.
- We also recommend eating fish, which are a great source of vitamin B12.
- If you follow our recommendations, you will consume enough vitamin B12. This means that you do not need to compensate with food supplements. However, we do recommend them to vegetarians, because vegetarian food does not contain vitamin B12.

WHY WE NEED IT
red blood cell maturation, the functioning of the nervous system, DNA synthesis

THE EFFECTS OF THE LACK
anaemia, psychological disorders, bad eye sight

WHERE IS IT FOUND
beef, pork, offal, eggs, milk and dairy products

Did you know that the elderly have lower levels of vitamin B12? And this is supposed to be one of the reasons, why our memory fades with increasing age. It is also very likely that vitamin B12 deficiency plays an important role in the development of Alzheimer's disease, therefore intensive research is on-going in this field.

VITAMIN D

Vitamin D is an important vitamin, which enables the absorption of calcium from the intestines into the blood – vitamin D, allows the calcium to be incorporated into our bones, and is therefore an important factor which enables healthy bones. The level of vitamin D depends on our diet and the exposure to sun, as well as on our genetic makeup.

In a study, started in 2010, vitamin D levels were measured for 33 000 people and several genes were analysed for their influence on vitamin D uptake. Three genes, that slightly varied between people and influence vitamin D levels, were identified. The mutation in the **gene GC** had the greatest influence, and people with two unfavourable copies of the gene had a 20 percent lower vitamin D level. Genes DHCR7 and CYP2R1 have also been analysed in addition to GC, and they had an equally important influence on the vitamin D level. The three genes mentioned have been included in our analysis and, based on this analysis, we can effectively predict the level of vitamin D determined by your genes.

YOUR RESULT:

AVERAGE LEVEL

The analysis has shown that you are the carrier of a genetic makeup which determines an average vitamin D level.

Recommendations:

- Your genetic makeup determines an average vitamin D level, and with an appropriate choice of foods, you can further improve your state.
- Compared to people with the most favourable genes, you have slightly higher vitamin D requirements, and we recommend that you consume 25 mcg of vitamin D daily.
- There is plenty of it in fish (sardines and mackerels), and dairy products (creme fraiche, Edam cheese, and mozzarella).
- We recommend regular walks in nature, because sun exposure encourages the synthesis of vitamin D.
- The lack of vitamin D can express mostly in vegetarians and, in this case, we recommend food supplements.

Did you know that magnesium is one of the important factors that influence activity of vitamin D? Sufficient levels of magnesium in the blood are essential to convert vitamin D into its active form. Also magnesium plays an important role in the influence of vitamin D on the immune system.

WHY WE NEED IT
calcium absorption from intestines into the blood, the formation and regeneration of bones

THE EFFECTS OF THE LACK
incorrect growth and healing of bones, rickets, occasional muscle cramps

WHERE IS IT FOUND
milk, beer yeast, fish oil, sardines, salmon, tuna, liver

IRON

Iron is a mineral which is needed for a healthy blood and an adequate functioning of numerous enzymes. Although the problem is mainly its lack, some people actually have an excess of iron. In order to avoid the two extremes, the iron level in our body is carefully regulated.

One of the genes that are in charge of the appropriate iron level in our body is the **gene HFE**. In some people it is dysfunctional, and this results in a too high iron level. According to scientific articles, 80 percent of people that have a too high iron level have an unfavourable variant of the HFE gene present on both of their chromosomes. However, among these, only 28 percent of men and 1 percent of women actually developed signs of excess iron accumulation in the body. This information proves that apart from the high importance of genes, our diet also plays a vital role, since it determines 70 percent of the final iron level.

YOUR RESULT:

LOWER LEVEL

Our analysis has shown that you have unfavourable copies of the analysed genes present, which determines a genetic tendency for a lower iron level.

Recommendations:

- Your genotype determines a lower iron level, which is unfavourable, and we advise you to increase your daily iron level to 15 mg.
- We recommend pumpkin seeds, pistachios, cashews, poppy and sesame seeds, rice bran and clams, where the biggest amount of iron is found.
- In order to accurately follow your daily requirements, we recommend a regular use of nutrition charts, in which you should check which foods contain plenty of iron.
- In addition, we recommend eating carrots, apricots, grapes and tomatoes, which contain beta-carotene and vitamin C. The latter actually increases the absorption of iron into the body.
- You should also consider food supplements, which contain iron in many forms.

Although most people believe that their iron levels improve most effectively with the consumption of beef, it is actually dark chocolate that contains three times more iron. In addition to dark chocolate, more iron is present even in some grains and nuts than in meat. This fact is crucial especially for vegetarians.

WHY WE NEED IT
oxygen supply to the body, enzyme function

THE EFFECTS OF THE LACK
anaemia, fatigue, weakened immune system

WHERE IS IT FOUND
pork, beef, liver, red meat, mussels, egg yolk, nuts, beans, oatmeal

SODIUM

Sodium is the main ingredient of kitchen salt, and it is also present in many other foods – predominantly those of animal origin. It is responsible for a normal functioning of the nervous system and the muscles, as well as for maintaining the osmotic pressure and the regulation of the amount of water in the body. Our body usually does not have problems with the lack of sodium, and food with less sodium is therefore considered the healthiest. It has been proven in many studies that an excessive intake of sodium (salt) is an important health risk factor. Sodium actually increases blood pressure, and this leads to other medical conditions. In the studies, where they attempted to gradually decrease salt intake, the systolic blood pressure (the pressure when the heart pushes the blood through arteries) in adult population dropped by 5 percent in average, which reduced the occurrence of stroke and cardiovascular disease by 24 percent and 18 percent, respectively. It is, therefore, recommended to limit salt intake. This is much more important for people whose blood pressure is even more sensitive to sodium or kitchen salt due to their genetic makeup.

YOUR RESULT:

AVERAGE SENSITIVITY

Your sensitivity to sodium is average; however, you are more sensitive compared to people with the most favourable genetic makeup.

Recommendations:

- We recommend low sodium foods, which means that you should try to limit your daily sodium intake to not more than 1200 mg.
- Pay attention to food labels: choose foods that do not have added salt.
- Instead of improving the taste of food with salt, use different herbs and spices. We recommend lemon, bay leaf, nutmeg, coriander, dill, garlic or mint.
- It is also important that you drink 2 litres of fluid daily. This way the excess salt will pass out of your body.
- Consider also the recommendations from the "Potassium" analysis, because its lack also influences the increase of blood pressure.

Throughout history salt has had great importance, because it was more important than gold for survival. Salt was a privilege of kings and the upper strata of society. It was even used in prophecies and for foretelling destiny. Metaphorically it symbolizes devotion and loyalty, so even today in many places hospitality to the guests is shown by sharing bread and salt.

WHY WE NEED IT
normal functioning of the nerves and muscles, influence on the blood pressure, carbohydrate digestion

THE EFFECTS OF THE LACK
dehydration, disrupted digestion of carbohydrates, muscle cramps

WHERE IS IT FOUND
salt, mineral water, cheese, mussels, red beet, meat

POTASSIUM

Potassium is, right after calcium and phosphorus, the most widespread mineral in our body. It is important for maintaining a regular heartbeat, the muscle contraction and water regulation in the body. Although, in principle, it is not difficult to enrich our diet with potassium, its lack in people is very common. This is unfavourable, because the lack of potassium increases blood pressure.

In a scientific research on which our analysis is based it has been shown that a variant of the **WNK1 gene** influences the potassium level in our body. WNK1 is a gene which regulates the transport of potassium, and its link to the potassium level is, therefore, not surprising. Above mentioned research has shown that each unfavourable variant of the WNK1 gene reduces the potassium level by approximately 5 percent. People with the least favourable genetic makeup have, therefore, a 10 percent lower potassium level.

YOUR RESULT:

LOWER LEVEL

The analysis has shown that you are the carrier of two unfavourable copies of the WNK1 gene, which determines a lower potassium level. Approximately 43 percent of people have such a genetic makeup.

Recommendations:

- In spite of an unfavourable genetic makeup you can improve your state with an appropriate choice of foods which contain more potassium.
- We recommend that you consume 4000 mg of potassium daily, as your requirements are slightly higher.
- The highest amounts of potassium can be found in apricots, blueberries, leek, pistachios, cereal sprouts, pumpkin seeds and brook trout, and you should often opt for these foods.
- In order for you to carefully follow our recommendations, we recommend the use of nutrition charts.
- We also recommend that you drink alcohol moderately. Too much alcohol brings many negative consequences for your health, and it additionally influences the decrease of potassium level.

Potassium is the first element, which was obtained by the use of electrolysis of the molten salt. Its name derives from the Arabic word, which means the plant ash. Plant ash includes potassium carbonate, which is also used in the production of soap.

WHY WE NEED IT
nervous impulse transfer, muscle contraction, maintaining an appropriate blood pressure

THE EFFECTS OF THE LACK
loss of fluid, weak blood flow, fatigue, weakened muscles, disrupted heart rhythm

WHERE IS IT FOUND
oranges, bananas, avocado, melons, broccoli, tomatoes, dried apricots, raisins, fish, carrots

VITAMIN E

Vitamin E, also known as tocopherol, is the most important representative of fat-soluble antioxidants. Its importance is illustrated by the fact that certain people lacking vitamin E, are more prone to chronic diseases, while people with a higher vitamin E level have less health problems and even slightly better physical abilities.

The scientists have started to ask themselves why differences in vitamin E levels among people even occur. They have discovered that the reason is not only food. Scientific research has proven that a favourable mutation can occur in the gene APOA5 increasing the vitamin E level. People with such a genetic makeup have already a higher vitamin E level to start with, and they, as a result, need a lower daily intake of vitamin E for an optimal state. People with a common variant of the APOA5 gene have to include foods with more vitamin E into their menus, in order to ensure an optimal state.

YOUR RESULT:

AVERAGE LEVEL

Your genetic makeup determines an average vitamin E level, but, in comparison to people with one or two favourable copies of the APOA5 gene, your vitamin E level is lower.

Recommendations:

- You are the carrier of the most common genetic makeup, but this does not represent the most optimal result.
- We recommend you to consume 14 mg of vitamin E daily. This is a slightly higher intake than usual, which will enable an optimal vitamin E level in your body.
- We advise you to eat more vitamin E rich food. Plenty of vitamin E can be found in wheat sprouts and their oil, almonds, hazelnuts and broad beans.
- With less than a teaspoon of wheat sprouts you already fulfil your daily requirements, and we are convinced that with an appropriate choice of foods you will easily fulfil your daily vitamin E requirements.
- Some of the vitamin E is lost with baking, roasting and sautéing, so your source of vitamin E should, predominantly, be fresh vegetables, nuts, seeds and quality oils.
- We recommend that you store foods in the dark, because vitamin E is sensitive to light.
- When shopping, read the food labels and be sure about the amount of vitamin E that a certain product contains.

Vitamin E is present in eight different forms, which differ in biological activity. The most active and also the most common form of vitamin E in the body is alpha-tocopherol. The synthetic form of alpha-tocopherol is only about half as active as the natural, therefore it is needed to consume twice the amount for the same effect.

ROLE
protects against oxidative stress

CONSEQUENCES OF ITS LACK
The build-up of free radicals

WHERE IS IT FOUND
olive oil, wheat sprouts, cabbage, corn, soy, wheat, rice, avocado, olives, carrots, tomato, almonds

THE EFFECTIVENESS OF YOUR METABOLISM

GENES HELP YOU LEARN ABOUT YOUR BODY'S METABOLISM

Our body, with the help of specific enzymes, processes or breaks down lactose, caffeine, gluten and alcohol after their consumption. This enables them to be used as nutrients, or prevents these substances from becoming harmful. If a certain enzyme does not function optimally, an inappropriate adaptation can lead to certain health problems.

Lactose intolerance is one of the well-known phenomena, where lactase, an enzyme which is responsible for the breaking down of milk sugar lactose, is lacking. In case of lactose intolerance, our organism cannot break down milk sugar, and lactose intolerant people have many problems, such as diarrhoea, bloating and vomiting, when eating dairy products. Among important processes are also the metabolism of alcohol, caffeine and gluten. For all of them, a slow and ineffective metabolism is problematic. In this chapter you will find out about your response to those substances and according to your genetic makeup, you will be given the most suitable recommendations.

ALCOHOL METABOLISM

Have you ever wondered why some people's faces become red and they experience headaches, nausea and increased heart rate after consuming the slightest amount of alcohol? Well, scientists have succeeded in clarifying this phenomenon on a molecular level. Namely, the reason for this is the defect of the gene which codes for the enzyme ALDH2. This enzyme is responsible for the breakdown of acetaldehyde – an intermediate product in ethanol metabolism, which is even more toxic than ethanol itself. In people with a defect of the **ALDH2 gene,** acetaldehyde accumulates, and this is the reason why they usually avoid drinking. Despite the fact that this defect is more characteristic of Asians, it does occur in other peoples as well.

YOUR RESULT:

EFFECTIVE METABOLISM

Your genetic makeup determines an effective alcohol metabolism. Namely, you are the carrier of the most favourable genetic makeup.

Recommendations:

- Your genetic makeup determines that you don't experience any problems related to the accumulation of harmful substances from alcohol metabolism.
- When drinking alcohol in moderation, you do not get any typical signs such as blush redness of the face, headache, nausea or unpleasant itching and increased heart rate.
- We advise you to drink in moderation, because excessive alcohol drinking can have many negative consequences – medical and sociological ones.
- 1 dl of wine or 2 dl of beer per day is still recommendable, as it increases the levels of good (HDL) cholesterol. However, we do advise against higher amounts of alcohol.
- Despite an effective alcohol metabolism, we recommend that you avoid drinking alcohol during and after physical activity.

It is well known that the French are not stingy when it comes to using fat in preparing their meals. They eat more butter, cheese and pork than Americans, but their frequency of cardiovascular diseases is lower. The fact that the French consume large amounts of red wine is believed to be their secret for success. Scientists have named this phenomenon the French paradox.

CAFFEINE METABOLISM

Caffeine is a natural alkaloid, most commonly known as the main ingredient of coffee. It is metabolised in the liver by the enzyme, called CYP1A2. This enzyme is responsible for up to 95 percent of the entire caffeine metabolism, and it is, therefore, not surprising that a mutation in the **CYP1A2 gene** has an important influence on the enzyme activity and, consequently, the caffeine metabolism. People with one or two mutated copies of the CYP1A2 gene metabolise caffeine more slowly, and as a result, feel a greater effect of coffee. But this is not as favourable as it may seem, because these people have a higher blood pressure after drinking coffee than those with a rapid caffeine metabolism. Researchers have proven in many studies that people with slower caffeine metabolism are more susceptible to medical conditions related to increased blood pressure. We, therefore, recommend them to adjust the daily dose of caffeine accordingly.

YOUR RESULT:

RAPID METABOLISM

The genetic analysis has shown that you are the carrier of two favourable copies of the CYP1A2 gene, and you, therefore metabolize caffeine rapidly. 52 percent of people have such a genetic makeup.

Recommendations:

- You are the carrier of a genotype that determines a rapid caffeine metabolism, which means that caffeine is quickly removed from your body.
- Because of your genotype, you are less susceptible to the risk for health complications related to increased blood pressure.
- Nevertheless, we recommend that you do not drink more than two cups of coffee a day.
- If you are an avid drinker of coffee, we recommend that you substitute it with a cup of black tea or a cup of decaffeinated coffee, which is even better.
- Caffeine is a diuretic, and, because of this, we recommend sufficient amounts of water which will help you replace lost fluid.

A creeping plant originating in the Amazon, guarana, contains a substance guaranine, which is almost identical to caffeine. Twice the amount of guaranine is present in guarana in comparison to caffeine in coffee beans. Guaranine is a caffeine alternative in some carbonated drinks and energy drinks.

LACTOSE INTOLERANCE

Milk provides the first and most important nutritional ingredient for every baby and child. With the exception of lactose intolerant people it retains its nutritional value in the diet of adults as well. Lactose intolerant people, though, do not have the enzyme lactase which is responsible for the breakdown of milk sugar lactose, and this is why they have to limit milk consumption. The reason for the absence of the lactase enzyme is the **gene MCM6**, which is actually not functionally related to lactose metabolism, but it regulates the activity of the **gene LCT** (gene which encodes for the lactase enzyme) and it consequently determines whether we will have the lactase enzyme or not.

Lactose intolerant people experience the accumulation of lactose in their colon, where it is decomposed by intestinal bacteria. Various fats are formed, as well as gasses and other molecules. The consequences are diarrhoea, a bloated stomach and stomach cramps. We can also experience nausea or vomiting. These signs occur 15 minutes to 2 hours after the consumption of milk or dairy products, and they depend on the amount of lactose we consume, age and health condition.

YOUR RESULT:

EFFECTIVE METABOLISM

You are the carrier of one favourable and one unfavourable copy of the MCM6 gene. You genetic makeup determines a slightly lower amount of lactase enzyme, but still sufficient for effective metabolism of lactose. Approximately 37 percent of people have such a genetic makeup.

Recommendations:

- Considering the results of the analysis, food, containing lactose, should not cause you problems.
- Your version of genes determines that you have enough of the lactase enzyme, and it is, therefore, unlikely that you are lactose intolerant.
- Eating dairy products is, from the point-of-view of the milk sugar metabolism, for you completely recommendable.
- Milk, yoghurt, kefir or whey are already, as such, very healthy, and we, therefore recommend them.

According to some estimates, as much as 30 to 50 million Americans have lactose intolerance, most Asians, 60-80 percent of African Americans and 50-80 percent of Latinos. Lactose intolerance is the least common among indigenous peoples of northern Europe, where it occurs in around 2 percent of the population.

GLUTEN INTOLERANCE

Gluten is a general name for the protein, which is best known for its presence in wheat, rye, barley, kamut, spelt and some others. It helps foods maintain their shape, acting as a glue that holds it together. This is why it's often added to processed and packaged foods. For instance, candy, sauces, snack foods and hot dogs are very likely to contain gluten. Generally, gluten is not bad for your body, unless you are gluten-intolerant. This means your body responds negatively to ingested gluten. There are various forms of gluten related reactions, but the most common ones are: celiac disease, wheat allergy and non-celiac gluten sensitivity. In these cases, a gluten-free diet is recommended, since the organism produces an immune response when breaking down gluten during digestion. The healthiest way is to seek out naturally gluten-free food groups. These include fruits, vegetables, meat, fish, seafood, dairy, beans, legumes and nuts. Also, buckwheat, millet and maize are gluten-free. Try to avoid highly processed foods.

The genes that we have analysed, are **DQA1** and **DQB1**, which tags for HLA-DQ2.5 and HLA-DQ8. Most of the gluten intolerant patients have variant present in both two genes. However, the presence of the variants itself doesn't mean that you are gluten-intolerant, since researches show genetic variants are also present in 30 percent of healthy people. But the percentage of gluten-intolerant patients with the presence of these variants is much higher. More than 95 percent of patients with celiac disease and 50 percent of patients with non-celiac gluten sensitivity have mutations present in both of these two genes. Other types of gluten related disorders, such as wheat allergy or dermatitis, are not linked to the analysed genes.

YOUR RESULT:

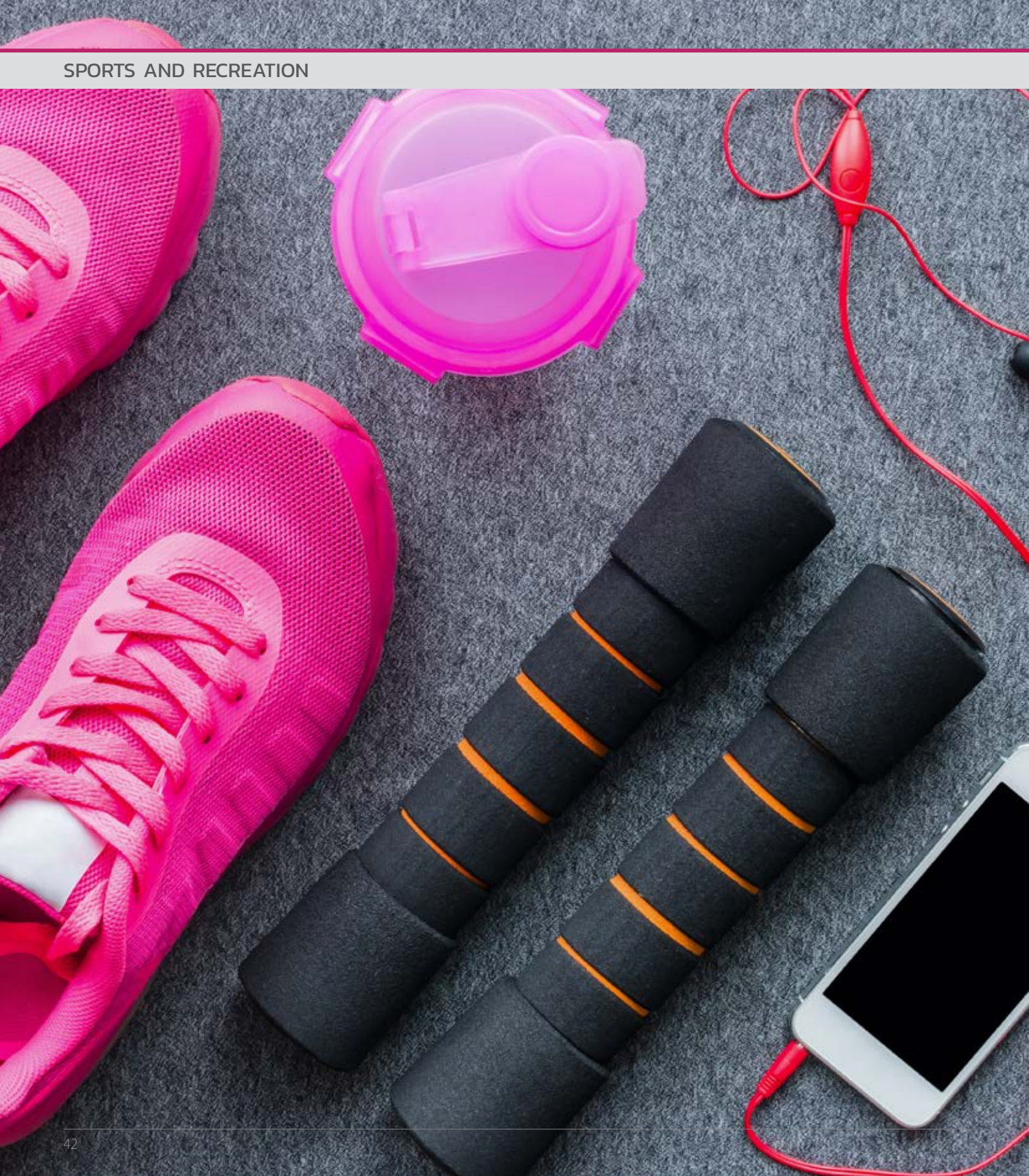
LOW LIKELIHOOD

Our analysis has shown that your genetic makeup determines lower likelihood for gluten intolerance.

Recommendations:

- Your genetic makeup determines that you most probably do not experience any problems when metabolising gluten.
- Based on your genetic result, there's no reason to omit eating food, which for instance contains wheat, rye, barley, kamut and spelt.
- We recommend you to eat as diversely as possible and not to try either omit or increase its intake.
- As already stated, only in 50 percent of people with non-celiac gluten sensitivity the genes that indicate gluten intolerance are found, so there is a chance that you are in the other half. If you experience problems such as gas, bloating, diarrhoea, constipation, and also fatigue, "brain fog" or feeling tired after consuming gluten, consider going on a gluten-free diet and consult with your doctor. Have in mind that gluten can be found in many food products, therefore you need to carefully read the declarations and you should not forget about the sufficient intake of fibers, vitamins and minerals.

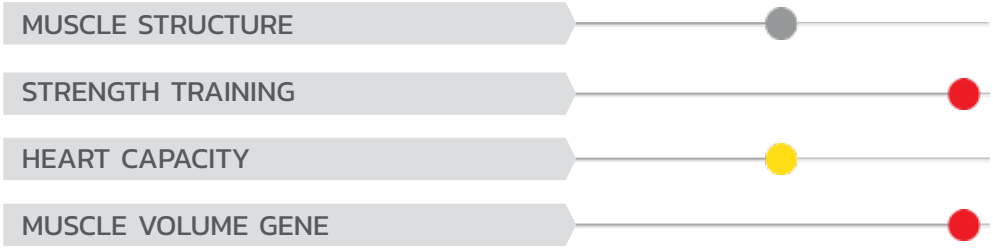
Some promote gluten-free diet as a way to lose weight, or as a healthy diet for the general population. These claims are ungrounded. The gluten-free diet is healthier for people with gluten-related disorders, but there is no evidence that it is beneficial for people who do not have these conditions.



SPORTS AND RECREATION IN TUNE WITH YOUR GENES

DISCOVER THE WORKOUT MOST SUITABLE FOR YOU

In this chapter we will reveal to you the sports activities that you can be good at on the basis of your muscle structure. You will find out how beneficial a certain type of training is for you. Physical activity affects our health generally positively, but certain sports activities are more beneficial for some than they are for others. As an example, scientists have discovered that a certain type of recreation can benefit some people, while the influence of it on others can be less optimal, or can even affect the accumulation of fatty tissue. All this strongly depends on our genetic makeup. For instance, genetics has a great influence over components of the athletic performance such as strength, power, endurance, muscle fibre size and composition, flexibility, neuromuscular coordination, temperament and other phenotypes. And this is precisely why we can, with the help of your DNA analysis, give you supportive recommendations, which help you on your way towards the desired goals.



MUSCLE STRUCTURE

Humans have two different types of muscles, **type I** and **type II.** Sprinters tend to have more type II muscles in their bodies – fast muscle fibres, or more active fibres, and long distance runners tend to have more effective type I muscles – slow muscle fibres.

A study by Australian scientists has included more than 400 top athletes divided into two groups. The first group included athletes from disciplines where mostly strength and speed are needed, and in the other group included those who required endurance. They discovered that, in the first group, people with two copies of a functioning **ACTN3 gene** prevailed, and, in the second group, people with two copies of a non-functioning ACTN3 gene prevailed. It has been, therefore, proven, that the mentioned gene determines the effectiveness of a specific type of muscle fibre. In addition to this gene, a mutation in the PPAR-alpha gene is also known. PPAR-alpha gene determines the representation of a specific type of muscle fibres in our body. By simultaneously analysing both genes it is possible to predict the activities that you are likely to be the most successful at.

YOUR RESULT: GREATER MUSCLE ENDURANCE

The variants of genes ACTN3 and PPAR-alpha give you the advantage in long distance running or sports where endurance is required.

Recommendations:

- The result of the analysis has shown that your muscles have more endurance and have slightly less strength and explosiveness.
- Because of your genetic makeup your potential is towards activities where muscle endurance is required.
- Among activities that match your genetic makeup are definitely different types of long distance running (marathons), aerobics, cycling, rollerblading, swimming, climbing and hiking.
- If you are not yet accustomed with aerobics, start with continuous, low intensity (55-75%HRmax) activities and gradually progress towards moderate intensity (70-90%HRmax) interval training protocols.
- From the health and wellbeing point of view, aerobic activities, lasting between 30 to 50 minutes, are most beneficial.
- The recommended frequency is 2-4 times a week, depending (among other important factors) on your involvement in other types of training.
- If you are an experienced endurance athlete it may be very useful to swap some of the long runs you are used to by a high intensity interval training.
- Being genetically gifted for endurance activities doesn't mean that you should neglect strength or flexibility or other fitness components. Fitness is a well-tuned blend of all functional human abilities. So NEVER forget to train your "weak links in a chain"!

The human body has approximately 640 skeletal muscles. When walking, we don't even realize that more than 200 muscles are activated. The longest muscle in humans is the tailors muscle (musculus sartorius), which runs across the thigh; the smallest is the stapedius (musculus stapedius), which is located in the eardrum. It is a mere 1.27 millimetres long.

STRENGTH TRAINING

Strength training can be defined as the use of resistance for contracting muscles with the objective to acquire strength, size and anaerobic endurance of muscles. If performed correctly, strength training can influence the improvement of overall health and well-being, as well as the increase of bone strength, the health of muscles, tendons and ligaments. It reduces the potential for injury and improves the heart function. Whenever we want to get rid of excess fat, an intensive training is not equally effective for all people. Scientific research studied people who had gone through a 12-week intensive training program. After finishing the program, some people had gained approximately 6 percent more subcutaneous fats. This phenomenon is proven to happen due to our genetic makeup that influences our susceptibility to certain physical exercises. In case of women, these findings are not confirmed. This is not surprising, because both men and women have a completely unique system of fat accumulation and fat-burning.

YOUR RESULT:

LESS RECOMMENDED

You have one common and one rare copy of the INSIG2 gene present, and, because of this, there is a greater probability, that you experience slight excess fat accumulation with intensive strength training. 39 percent of people have such a genetic makeup.

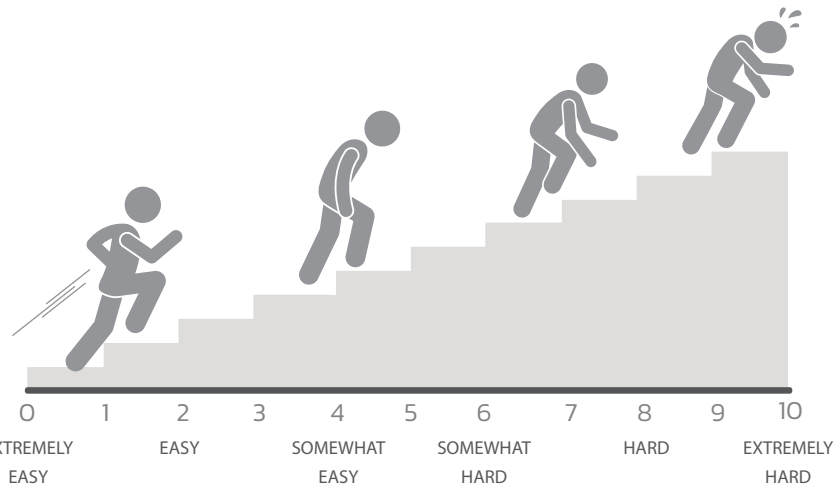
Recommendations:

- Intensive strength training is not highly recommended for you, because you are, considering the research, prone to slight fat accumulation, when training intensively.
- We recommend easier types of strength training where you work with your own weight: push-ups, sit-ups, lifting yourself on a bar, jumps. You may, occasionally, use lighter weights.
- Practice also other types of recreation such as walking, running or cycling.
- In addition to this, practice balance exercises: exercises with a ball or elastic equipment.
- You can also decide on one of the activities from the "Muscle structure" analysis, which are adapted to your muscle structure.

Did you know why men have more muscle mass? The hormone testosterone is responsible for this – we all have it in the body, but young men have the highest levels. The link between the hormone testosterone and muscle mass is very strong. Intense exercising increases the levels of this hormone, so the muscle strength is also increased.

HEART CAPACITY

Our heart pumps about 5 liters of blood every minute when we are resting, while during exercise it pumps about 5-times as much blood as during rest. Our aerobic capacity depends on "central" factors - the ability of the lungs and the heart to bring oxygen to the working muscles, as well as on "peripheral" factors - the ability of those muscles to use the delivered oxygen in the process of producing fuel for a muscle contraction. A good heart condition is therefore an essential element which enables us to take advantage of our overall sport potential. Regular physical activity is universally accepted as a central component of a heart-healthy lifestyle as it induces beneficial changes in the cardiac function (better heart capacity), which furthermore, importantly affects our aerobic capabilities. For example, a physically active individual can perform the same amount of physical work with less strain on the heart (indexed as lower heart rate and blood pressure during a given work output) than a sedentary person. This is due to the reason that our heart has to be able to actually transport the necessary amounts of oxygen to our muscle tissues. For example, your heart may not be able to pump enough blood with each beat – and since blood contains oxygen, this limits your oxygen capacity. Good heart capacity is therefore an important independent element of your overall aerobic capacity. In addition to this, better heart capacity is associated with improvements in traditional cardiovascular disease risk factors: lower blood pressure and plasma low-density lipoprotein cholesterol levels (LDL) and increased plasma high-density lipoprotein cholesterol levels (HDL).



OMNI scale *- scale of perceived extertion*

A reduction in heart rate for a given intensity is usually due to an improvement in fitness but a number of other factors might explain why heart rates can vary for a given intensity: dehydration can increase the heart rate by up to 7.5%, heat and humidity can increase the heart rate by 10 beats/minute, altitude can increase the heart rate by 10 to 20%, even when acclimatized and also biological variation can mean the heart rate varies from day to day by 2 to 4 beats/minute.

YOUR RESULT:

AVERAGE HEART CAPACITY POTENTIAL

Our genetic analysis has revealed that your heart capacity genetic potential is somewhere in the average area, as you have the most common genetic makeup in the population.

Recommendations:

- Different scientific studies have shown that to a certain degree our heart capacity potential is determined by our genes. However, our heart is a muscle and with appropriate exercise it will become larger and become more efficient as a pump.
- Your heart capacity is an important element of your overall aerobic potential. Since your result is somewhere in between good and bad, heart capacity shouldn't be the limiting factor towards achieving high aerobic capacity.
- However, your genes determine only your potential, while to fulfil your potential, it's the most important to take the advantage of your potential.
- It is therefore good to know that the body's ability to transport oxygen to, and carbon dioxide away from the working muscles can be developed and improved.
- If you are a beginner, start with any kind of aerobic activity that you think you can persist for few months.
- If you have problems with ankles, knees and a lower back, rather than running, stick to "low impact" aerobic activities.
- Start with 15-30 minute sessions 3-5 times a week, depending on your initial aerobic and orthopaedic condition. A moderate intensity 60-75%HRmax or RPE - 6 (OMNI Scale) will be effective enough.
- Gradually increase your workout sessions time to 40 minutes.
- After a few months you will be ready for more advanced aerobic interval training methods.
- It is important to realize that as far as health benefits are your main concern and the cardio-vascular system is your main target organ, moderate intensity and volumes are good enough to reach the goal.

MUSCLE VOLUME GENE

To determine your potential to increase your muscle size (hypertrophy), we analyse a specific gene, called **IL15RA**, which is involved in prevention of muscle breakdown, lean body mass and muscle building in response to training. Your result tells you whether you have a genetic variant present, associated with muscle size or whether you have the version linked to muscle strength in response to resistance training. It's obvious that some individuals respond much better to certain type of training than others. Some individuals look more muscular after one year of lifting than most people do after ten, since our progress largely dependent on our genetics.

Studies have shown that IL-15 is an important mediator of muscle mass response to resistance exercise training in humans and that genetic variation in IL15RA accounts for a significant proportion of the variability in this response. Significantly greater increases in total lean mass and arm and leg circumference were observed in those with an A allele. However, muscle strength gain was in the opposite direction, in which the mean relative strength (strength, expressed per kg of your body mass) gain was lower with the addition of each A allele.

YOUR RESULT:

LOW MUSCLE VOLUME POTENTIAL

The analysis has shown that your genetic makeup doesn't give you an advantage in terms of muscle volume compared to the individuals with one or two A copies of IL15RA present. However, it gives you an advantage in terms of muscle strength and quality gain after training (e.g. relative strength).

Recommendations:

- IL15RA gene regulates the bioavailability of the IL-15 protein, a growth factor, expressed in our muscles. IL15RA therefore indirectly affects muscle size and their strength.
- The analysis has shown that you are the carrier of two copies of IL15RA gene, associated with decreased potential for muscle size in response to strength training, while at the same time, you have great potential for more muscles strength.
- In terms of muscle size, you are a "hard gainer" and you don't respond well. As a result of resistance training, people with your genetic makeup can expect to benefit from muscle strength and quality, rather than high muscle volume.
- Of course, the rate and amount of adaptation is highly influenced by genetics, but appropriate training methods will always account for a large portion of training effects.

HOW DO WE BECOME STRONGER?

We become stronger as a result of body's adaptation to a special stimulus, produced by a muscle loading during resistance training.
That stimulus should be greater than the ones we are used to, otherwise the system "doesn't feel" an urge to adapt. So strength training is quite about leaving the comfort zone behind.
Next, the adaptation is time and type of load dependent. From the TIME perspective, beginners progress pretty fast with weight training since the adaptation is mostly neurologic. It means that our inter-muscular and intra-muscular coordination becomes better. Sometimes, these kinds of gains are called "qualitative", because muscles learn to perform better without getting bigger. Intramuscular coordination refers to an ability of a given muscle to be more engaged in a certain movement. In other words, how effective is the coordination between the muscle fibres of that single muscle. Inter-muscular coordination refers to the ability to coordinate the cooperation, timing and a level of engagement of all the muscles in your body during a certain move or exercise. While some muscles are in charge of moving a limb, others should stabilize the spine or be relaxed enough to "permit" the movement to happen. Usually, the first 2-3 month of strength training mostly improve this (quality) component.
When the ability to gain strength, mostly due to a neurological adaptation, starts to diminish, another form of adaptation permits us to keep on going with the weights. This is called muscle Hypertrophy (check out a corresponding topic for more information). This form of adaptation is called morphologic or "quantitative", since it requires a new tissue formation: the muscles cross sectional area become larger and they have more contractile protein content inside. From the type of training perspective, we can adjust the type of preferable adaptation by "playing" with such components as volume, intensity and tempo (time under tension). While high loads and low repetition sets (RM 1-5) target mostly a neurological component of strength, higher rep's (RM 6-15) are associated with Hypertrophy stimulation, provided all other complementary circumstances are optimal. (Check out our RM chart for more information on this topic).

HYPERTROPHY AND MUSCLE VOLUME GENE

What factors contribute to a muscle Hypertrophy effect due to resistance training? Although genetics have a great influence on muscle size development potential, there are few more, evidence based factors, that may contribute to a muscle "building" process or, if not considered, to slowing down the hypertrophy gains:

- **Appropriate training protocols**

There is no "one size fits all" formula for muscle building, but usually (and there is much scientific evidence on this topic) the progressive resistance training protocols of 6-20 reps in 2-3 sets for a given muscle group done to momentary muscular failure/ fatigue bring a measurable results for intermediate class trainees. Note, that contrary to a common believe, it doesn't matter what kind of an equipment is used for that purpose (e.g. free weights, a body weight, machines or rubber resistance), but the amount of repetitions done to a failure.

- **Nutrition**

It's essential to meet the needs of the exerciser: calorie intake, building material (proteins), proper hydration, vitamins, minerals and similar... For more information about nutrition and recommended intakes for you check out first chapters of the report.

- **A good sleep**

Muscles don't grow while we train. They rather get damaged (undergo microscopic traumas) during heavy lifting. Training triggers an anabolic (tissue building) response and then the time does its job. We grow while we rest and especially while we sleep. Some very important muscle building hormones are released during sleep. Therefore take special care for having a good undisturbed sleep.

- **Focused training type**

For the Hypertrophy cycle/period, limit the unnecessary high energy demanding activities (long distance running or cycling, boxing, step or aerobics classes) to a minimum, because they tend to be extremely catabolic (an opposite of anabolic) from one hand and energy depleting from another.

- **Manage your stress**

High stress levels may slow down your growth, since stress hormones (like cortisol and adrenaline), that produce a sympathetic "background" for a long period of time also have a catabolic effect on muscle tissue. For more information on stress, check out our special stress topic.

GENETICALLY DETERMINED AGEING AND INFLAMMATION

YOU CAN INFLUENCE AGEING AND INFLAMMATION

In this chapter we will reveal your rate od ageing in comparison to the average population, and whether your genetic makeup determines that a change of lifestyle is important for you. You will also learn about inflammation sensitivity of your body. Beside genetics, environment and lifestyle also play an important part at ageing and inflammation, so you can do a lot to slow it down.

What is lifestyle, anyway? Lifestyle is a concept which had been established already in the 1929 by an Austrian psychologist Alfred Adler. With this concept, we describe our way of life, or our habits. It is generally known that smoking, alcohol drinking, inappropriate diet and lack of physical activity point on an unhealthy lifestyle and are the cause for many health problems. Excessive alcohol drinking and cigarette smoke additionally influence our ageing process, and, in case you have unfavourable genes which determine a higher rate of ageing, we recommend limiting alcohol and giving up smoking.

BIOLOGICAL AGEING

INFLAMATION SENSITIVITY

BIOLOGICAL AGEING

We differentiate two types of ageing, **chronological** and **biological**. In chronological sense, we are as old as our years of age, while biological ageing is the ageing of our body. It is about determining if our body looks according to its age. For example, when saying to 70-year old, that we would never think him to be as old, we actually say that, from a biological standpoint, this person looks younger.

The molecular cause for ageing is in the length of structure, called telomeres. They are the endings of our chromosomes consisting of a repetitive DNA sequence (TTAGGG). In the course of our lives, these telomeres become shorter, and this causes us to age. The rate of the shortening of telomeres depends on numerous environmental factors, as well as on the variant of the **gene TERC.** It has turned out that a mutation in the DNA sequence can occur. This manifests in shorter telomeres and, in average, a 3-4 years higher biological age of an individual with mutated copy of the gene.

YOUR RESULT:

SLOWER AGEING

Two favourable copies of the TERC gene determine a slower biological ageing. Approximately 53 percent of people have such a genetic makeup.

Recommendations:

- Your ageing is slower, compared to other people, but it is important to know that the ageing process is not determined only by the genes, as the actual state depends also on various environmental factors and bad habits.
- The rate of your ageing is, apart from your genes, an expression of your lifestyle, bad habits and diet.
- By strictly following our recommendations you will, undoubtedly, support your favourable genetic makeup and enable a healthy appearance of your body.
- We recommend activities in the fresh air, avoiding stress, positive attitude towards yourself and the environment, and, especially, following our advice.

Did you know that on average women live longer than men? Women have an advantage because of the hormone estradiol, which is a physiological antioxidant and acts as natural protection. In men, testosterone does not have this protective function; therefore, they are more susceptible to harmful elements from the environment.

INFLAMMATION SENSITIVITY

Inflammatory response is a vital part of the body's immune response. However, short-term and long-term inflammation should be distinguished. Short-term acute inflammation is a normal process in our body to recover after an injury or illness. It also occurs during recovery after exercise and influences muscle development. On the other hand, prolonged short-term acute inflammation can lead to long-term chronic inflammation and this can further result in cardiovascular complications and some chronic diseases of modern society such as heart disease, atherosclerosis, diabetes, high blood pressure and asthma. Environmental factors that can contribute to the level of inflammation are lack of sleep, excessive stress and poor nutritional choices. Besides, genetics also play an important part in the level of inflammation. The most studied genes in this context are the **IL6, TNF, CRP and IL6R genes,** which all encode for the inflammatory molecules and are as such strongly involved in the regulation of inflammation.

YOUR RESULT:

LOWER SENSITIVTY TO INFLAMMATION

Your genetic makeup determines lower sensitivity to inflammation. It's less likely that people with your genetic result will suffer from chronic inflammation.

Recommendations:

- Your genetic result is favourable. Bear in mind that beside your genes, your lifestyle and diet choices are the most important in keeping your inflammation level low.
- Also, make sure to include sufficient amounts of antioxidants and other anti-inflammatory nutrients in your diet. For example, dark green vegetables, celery, blueberries, broccoli, garlic, walnuts or salmon are all good choices.
- A diet rich in fibre also has anti-inflammatory effects. Optimally, you should be consuming about 25 grams of fibre on a daily basis. Nuts, peas, beans and lentils are good sources.
- Increased stress has a negative effect on the immune system and can lead to chronic inflammation. Perform deep breathing exercises regularly or engage in activities that you enjoy the most.

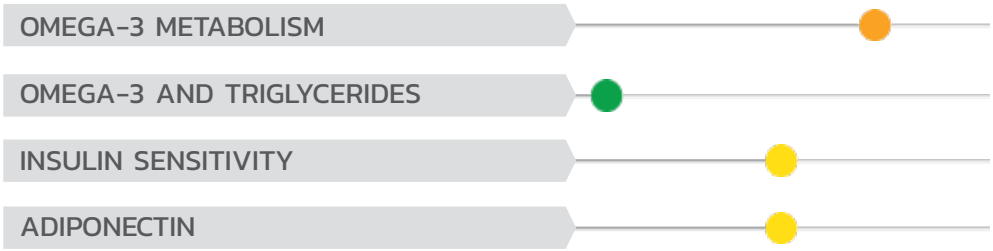
CARDIOVASCULAR HEALTH

WITH AN APPROPRIATE DIET YOU CAN PREVENT NUMEROUS HEALTH COMPLICATIONS

Triglycerides are the most common form of fat in the body. Elevated blood triglycerides levels represent an important risk factor for the development of cardiovascular diseases, therefore it is important to keep their level low. Omega-3 fatty acids are among the nutrients which can positively contribute to this.

Omega-3 fatty acids are a type of unsaturated fat and are essential for our body to function normally. We don't naturally produce omega-3 within our body and it is important we take in enough of it as part of our diet. It has been shown that sufficient daily intake of omega-3 can help towards lowering our blood pressure and level of triglycerides and at the same time is responsible for the proper functioning of the cardiovascular system and the brain.

In this chapter, you will learn how effective your metabolism of omega-3 fatty acids is, what is your tendency to high triglyceride levels and how efficiently your body regulates the level of insulin. Knowing your genetic predispositions to these and following the recommendations can lead you to better cardiovascular health.



OMEGA-3 METABOLISM

Omega-3 fatty acids are probably among the most known nutrients. They belong to the group of polyunsaturated fatty acids and are important for the proper functioning of the cardiovascular system and the brain. Studies have shown that sufficient daily intake of omega-3 can help towards lowering our blood pressure and level of triglycerides. Numerous members of the omega-3 family known, among which EPA (eicosapentaenoic acid), DHA (docosahexaenoic acid) and ALA (α-linolenic acid) are the most important. Adequate consumption of ALA is usually not problematic, since ALA is found in many plant seeds and their oils. On the other hand, adequate consumption of EPA and DHA is trickier as they are mostly present only in seafood (fatty fish, algae). To compensate this, our body has the ability to convert ALA into EPA and DHA. However, genetically susceptible people cannot rely on this due to the poor activity of the FADS1 enzyme, which is responsible for ALA to EPA & DHA conversion.

Recent studies have shown that a specific mutation in the FADS1 gene affects enzyme activity, which results in poor efficiency of the conversion described. Individuals carrying the unfavourable variant of the FADS1 gene are therefore at greater risk of EPA and DHA deficiency.

YOUR RESULT:

SLIGHTLY LESS EFFECTIVE METABOLISM

Analysis of your DNA has shown that you are a carrier of one favourable and one unfavourable copy of the FADS1 gene, which determines slightly less effective metabolism of omega-3 fatty acids. About 43 percent of the population worldwide has such genotype.

Recommendations:

- Your FADS1 gene encodes for slightly less effective omega-3 metabolism.
- Regardless, with a proper diet and lifestyle changes, you can get enough of all types of omega-3 fatty acids.
- We recommend that you include oily fish in your diet. Mackerel, herring, anchovies, salmon or tuna are the best source of EPA and DHA.
- If you don't like fish, you can also decide to take fish oil in supplements.
- If you are a vegetarian, we recommend you include algae in your menu. You can buy it dried in powder and simply add it to your favourite soup or salad.
- Bear in mind that bad lifestyle habits, such as smoking, high alcohol consumption, stress and high saturated fat intake affect the natural ability of our body to convert ALA to EPA and DHA. For you it is even more important to avoid these.

Did you know that omega-3 fatty acids are not beneficial only for our health but also represent a secret weapon for muscle growth? They reduce breakdown of proteins and inflammation, which leads to better recovery after the training.

WHY WE NEED OMEGA-3 FATTY ACIDS
they support the functioning of our heart and brain

DEFICIENCY
greater risk of cardiovascular diseases, joint pain, weight gain, lack of concentration, unhealthy skin, fatigue, eyesight problems

WHERE CAN WE FIND ALA
seeds and their oils (linseed, hempseed, rapeseed), nuts (walnuts, hazelnuts), soybeans and tofu

WHERE CAN WE FIND EPA & DHA
fatty fish (salmon, tuna, sardines) and algae

OMEGA-3 AND TRIGLYCERIDES

Elevated blood triglycerides represent an important risk factor for the development of cardiovascular diseases, therefore it is important to keep their level low. Omega-3 fatty acids are among the nutrients which can positively contribute to this. However, this effect greatly depends on the **FADS1 gene.** In a recent study, a 1.8 g daily intake of omega-3 reduced triglycerides level on average by about 20 percent in individuals with at least one favourable copy of the FADS1 gene. On the other hand, this lowering effect was only about 3 percent in people with two unfavourable copies of the FADS1 gene. Therefore, people with two unfavourable copies of the FADS1 gene should, in case of a high triglycerides level, focus on different strategies to lower their triglyceride level.

YOUR RESULT:
OMEGA-3 ARE MORE EFFICIENT AT LOWERING TRIGLYCERIDES

The DNA analysis has shown that if your triglycerides are high, you can benefit from increased intake of omega-3 fatty acids.

Recommendations:

- It is proven that a diet rich in omega-3 is more effective for individuals with your genetic make-up, when talking about decreasing blood triglycerides.
- In case your blood triglycerides are elevated, it is recommended to include more omega-3 in your diet.
- Good sources of omega-3 are salmon and tuna fish. For instance, 100 g of tuna contains 1.2 g of omega-3 and already covers about 65% of your total daily omega-3 needs.
- Instead of sunflower oil, which contains only omega-6 fatty acids, opt for canola oil, which is rich in omega-3. You can simply add one or two spoons of canola oil in a salad.
- While you should be careful when using oil for cooking, you can easily poach or bake fish. Don't worry, heating won't turn the omega-3 fatty acids present in fish into harmful trans-fats (as can happen with oils). This is because fish (as well as other foods) are fat-protein-carbohydrate complexes, which make food more temperature resistant.

Omega-3 helps our body to release the hormone melatonin, involved in the sleeping process. Therefore, among all the positive effects omega-3 fatty acids have, they can also positively affect your sleep. It is said that with sufficient intake of omega-3 you can expect to wake up less during the night and sleep longer. So, another reason to pay attention to the proper intake of omega-3.

INSULIN SENSITIVITY

Insulin is a hormone responsible for decreasing our blood sugar after each meal. Individuals with low insulin sensitivity need more insulin to lower their blood sugar levels as their system is less efficient. Their body simply compensates for this by producing more insulin in order to keep blood sugar stable. However, high insulin production is not so favourable and is associated with a variety of health complications, such as damage to blood vessels, type 2 diabetes, high blood pressure and heart disease. This makes insulin sensitivity and insulin blood level a valuable marker of our health.
In addition to various lifestyle factors, our genetic background plays an important role in insulin sensitivity. It has been proven that specific genes may protect us from decreased insulin sensitivity. For instance, a recent study has shown that individuals with two protective variants of the **PCSK1 gene** have 60 percent higher insulin sensitivity in comparison to those with two common copies of the PCSK1 gene.

YOUR RESULT:

AVERAGE INSULIN SENSITIVITY

The analysis of your genes has shown that your genetic makeup determines an average insulin sensitivity. About 85 percent of the population have such genetic predisposition.

Recommendations:

- Besides your genetic makeup, insulin sensitivity depends on many other factors.
- Excess body weight reduces insulin sensitivity and increases the risk of diabetes. If your BMI is higher than 25, you should consider losing some kilograms.
- Include foods rich in fibre especially those with soluble fibre, such as legumes, oatmeal, flaxseeds, Brussels sprouts and oranges. Soluble fibre can help to lower cholesterol, reduce appetite and increase insulin sensitivity.
- Add cinnamon to your tea, milk or yogurt. It has been shown that ½ to 3 teaspoons of cinnamon per day reduces short- and long-term blood sugar levels.

In history, diabetic patients received insulin extracted from the pancreas of cattle and pigs. Fortunately, genetic engineering and the development of new technologies has enabled pharmaceutical companies to produce human insulin using laboratory cell cultures nowadays.

ADIPONECTIN

Adiponectin is a hormone which regulates a number of metabolic processes. It reduces our appetite, enhances the ability of muscles to use carbohydrates for energy, and increases the rate at which our body breaks down fats. Through these processes, it promotes energy consumption. High adiponectin level is linked to higher HDL and lower triglycerides & LDL blood levels. Therefore, high blood adiponectin is widely accepted as a general protective marker against type 2 diabetes, obesity, atherosclerosis and some other cardiovascular diseases. Studies have shown that there is a strong genetic factor that influences adiponectin blood level. The most studied gene in this context is the **ADIPOQ gene**. A rare variant of the ADIPOQ gene works towards increased production of adiponectin hormone, and it has been shown that people with one or two rarer variants of this gene regulate triglyceride level more efficiently.

YOUR RESULT:

AVERAGE ADIPONECTIN LEVEL

You are a carrier of two common copies of the ADPIOQ gene, which determines average adiponectin production.

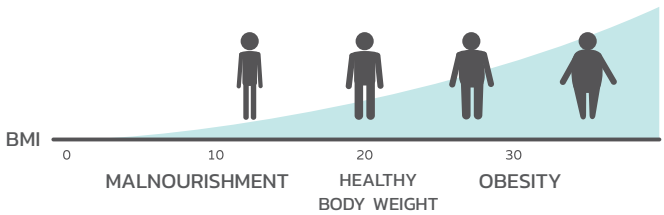
Recommendations:

- Genetic analysis of your DNA has shown that your ADIPOQ gene determines average adiponectin production.
- However, it's important to know that adiponectin is only one of the factors in the overall story.
- Therefore, don't forget that environmental factors also play an important role in adiponectin production.
- Keeping your BMI under 25 units should be one of the most import long-term goals.
- Studies have reported that components of sweet potato increase levels of adiponectin and improve fatty acids oxidation. Sweet potato baked in the oven can be a delicious side dish in combination with meat or vegetables.

Adiponectin is much higher in people with normal body weight than in obese individuals, which might sound surprising as adiponectin is produced exclusively in fat tissue. The reason simply lies in the fact that stimuli for its production originate from various addresses, which send the signals to the fat tissue and affect production.

MORE ON EXCESS WEIGHT AND BODY MASS INDEX

We define the appropriateness of body weight with the body mass index (BMI), which has been established in the 19th Century by a Belgian statistician Lambert Adolphe Jacques Quételet. It is calculated by dividing a person's body weight in kilograms by the square of the person's height in metres. An **optimal BMI** of an individual is in the area between **18.5 and 24.9 kg/m2**. People with such a BMI are said to have a healthy body weight. A **BMI lower than 18.5 kg/m2** is an indicator of malnourishment, and obesity is defined with a **BMI higher than 30 kg/m2**. The definition of obesity is not appropriate for two groups of people. In the first group, there are those with a high muscle mass, and this is the reason why their BMI is higher than 30 kg/m2. And in the second group, there are older people, who can have BMI lower than 30 kg/m2, because of rapid loss of muscle mass which is replaced by fatty tissue, but are still overweight.



According to the data of World Health Organisation (WHO), in 2005, approximately 1.6 billion people were overweight and 400 million were obese. In the USA, 61 percent of people were overweight and 20.9 percent were obese. As a result, WHO has defined obesity already in 1997 as a chronic metabolic disease, and short after named it as an epidemic, that threatens the whole world. The definition is supported by a piece of information which shows that, in western European countries, 2 to 8 percent of all health expenses are dedicated to treating obesity.

The state of being overweight is caused by an imbalance between the intake and the use of energy, lack of physical activity and genetic background. When we consume more calories than we daily expend, the excess generally accumulates in the form of fats. Fats are deposited in our fat cells, which start to grow and multiply. In order to reduce our body mass we, therefore, need to burn more calories than we consume. Energy consumption largely depends on the so-called basal metabolism – basic metabolism. It is the smallest amount of energy, which is daily necessary for a normal upkeep of basic life activities of our organism. People who are overweight have a lower basal metabolism rate and require daily a lower energy intake. Basal metabolism largely depends on our genetic makeup. It has been shown that there is an 80 percent probability that children of obese parents will also become obese. Scientists have discovered that our genetic makeup determines 60 percent of our final body weight, and the rest depends on other factors of life. It is important to bear in mind that environmental factors are mostly the ones that determine whether obesity will develop or not.

Giving up bad eating habits is the first and, at the same time, most crucial measure for reducing excess body weight. Also numerous food supplements, which regulate the processes of lipolysis and thermogenesis, can be of great assistance in achieving the desired results. These food supplements influence the increase of heat processes which need energy – the result is the increased burn of fatty deposits.

MORE ON VITAMINS

Vitamins, together with minerals, belong to a group of micronutrients. Despite the fact that we need them in very small amounts, they are absolutely vital for the functioning of our body. Most vitamins cannot be synthesized by our body. An exception are some vitamins of the B-complex, which are produced by our intestinal bacteria, and transformations of inactive to active form (for example, beta carotene can be transformed into active vitamin A). Vitamins are not a source of energy, but they are key co-factors which help the enzymes in an array of different metabolic reactions and biochemical organisms. Most enzymes actually cannot function without the help of vitamins. Vitamins can be divide into **water-soluble (B, C)** and **fat-soluble (A, D, E, K)**. Water-soluble vitamins are usually not stored in the body in large quantities and are quickly lost in the process of storing, processing and preparing foods. For a sufficient intake of water-soluble vitamins, it is recommended to eat whole wheat, unprocessed and fresh foods. Fat-soluble vitamins, however, can be found in fatty parts of animal as well as vegetable food. These vitamins accumulate in the body. Therefore, in the case of vitamins A, D, E, and K, there can be an excess intake of them.

WATER-SOLUBLE VITAMINS	B | C
FAT-SOLUBLE VITAMINS	A | D | E | K

MORE ON MINERALS

Most of **minerals** have the role of co-factors, and they are, therefore, vital for enzyme activity and the regulation of the chemical balance. They are important for the formation of different hormones and other key molecules in the body. It is precisely the minerals that ensure the strength of teeth and bones. They are important for an appropriate heart and kidney function, as well as the transmission of nervous impulses. Considering our daily mineral requirements, we divide them into two groups. Calcium, phosphorus and magnesium, which are the main constituents of bones, and sodium and potassium, which regulate the balance of the water in the body, are all **macrominerals**. Daily, we require relatively high amounts of them – from 50 to 3000 mg. Elements that our body requires only in traces (from 30 mcg to 50 mg) are **microminerals**: iron, zinc, manganese, copper, chrome and selenium. Despite the fact that we require so little of them, they are indispensable, as our body cannot function without them. We consume them either directly with plants or with the meat of animal that are herbivorous. The sources of minerals are actually plants that have the ability to incorporate them from the soil. Nowadays, the lack of minerals is common for many reasons. Firstly, the amount of minerals in crops is decreasing because of soil impoverishment, which is the result of intensive farming techniques. Intensively grown plants grow quickly, have higher water content and incorporate fewer minerals than non-intensively grown plant. Secondly, there is less minerals in food because of the processing and preparing of food. Refined cereals and sugars, compared to whole wheat cereals, contain only a few percent of minerals. And, last but not least, we are exposed to more harmful substances and nutritionally poor food which depletes our body and, as a consequence, our requirements of minerals are often increased.

MORE ON MUSCLE STRUCTURE

We know **fast and slowly twitch muscle fibres**. These two types of fibres differ in structure as well as their functioning. Slow muscle fibres produce energy mostly with cell respiration, and their main energy source are fats. They do not fatigue so easily, and are red coloured, because of the substance, called myoglobin. Fast muscle fibres, however, are rich in glycogene, and their energy source are not fats, but basic constituents, glucose and creatine phosphate. There can be a lack of oxygen in them, and lactic acid starts to form, making the muscles become tired.

type of muscle fibers	*process*	*source of energy*
FAST FIBRES	ANAEROBIC	GLYCOGENE
SLOW FIBERS	AEROBIC	FATS

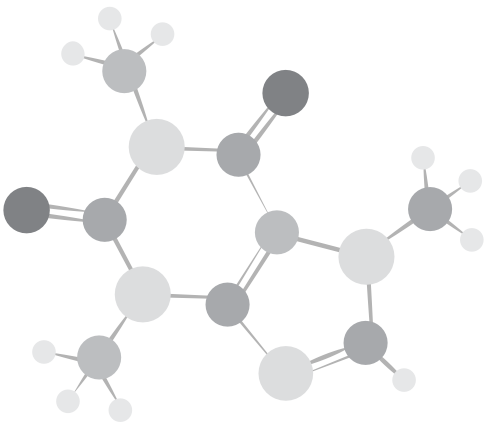
While studying neuromuscular disease, Australian scientists have started to pay attention to the **alpha-actinin (ACTN3) gene**, the product of which is important for muscle cell contraction. They have discovered that the product of this gene is present only in fast muscle fibres. They have identified a mutation which causes the product of this gene to become inactive, and, therefore, ACTN3 is in such people absent. In the research, which included top athletes, they have discovered that sprinters mostly have two active copies of the ACTN3 gene, while long distance runners have two inactive variants of the gene. They have, thereby, proven the hypothesis that an active ACTN3 gene is required for the explosiveness of muscles. In a second research, the scientists have proven that fast twitch muscle fibres, in which the ACTN3 gene is inactive, use more oxygen than those that have at least one active copy of the gene present. A greater need for oxygen slows down the muscles. Muscle fibres with an inactive ACTN3 gene are supposedly weaker and smaller, but they also become fatigued much later.

PPAR alpha is also a known gene, for which scientists have claimed that it is more active in slow muscle fibres, which is logical, considering its function. Namely, PPFAR alpha regulates the activity of genes, responsible for oxidation of fats. Endurance training actually increases the consumption of fats and, through activity of the PPAR alpha gene, increases the oxidative capacity of muscles. Because of its role in regulating the activity of numerous genes which encode muscle enzymes, involved in the oxidation of fats, PPAR alpha is probably an important component of the adaptive response to endurance training. In this gene, there is a known mutation which influences the gene's activity and even influences the ratio of fast and slow twitch muscle fibres in our body. A changed sequence of the gene influences a lower activity of the PPAR alpha gene in slow twitch muscle fibres, and causes that the percentage of slow muscle fibres in our body decreases, while percentage of fast muscle fibres increases. A mutated variant of the gene is present mostly in athletes who, for their disciplines, need strength and explosiveness.

MORE ON CAFFEINE

Caffeine belongs to **alkaloids**, and its chemical name is 1,3,7-trimethylxanthine. In its pure form it is a crystalline powder that has a slightly sour taste. It can be found in more than 60 plant species, in different parts of plants: coffee and cocoa beans, specific types of hazelnuts and in tea leaves, where it forms complexes, together with tannins. It is a mild stimulant, which stimulates the entire nervous system and the heart, and, in addition, functions as a weak diuretic – it accelerates the excretion of urine. It also has a psychological effect (excitation, unrest, better well-being), as well as a physiological one (increased alertness and concentration, reduced fatigue, increases metabolism, increases blood pressure). A cup of coffee contains approximately 200 mg of caffeine, a cup of tea approximately 80 mg of tein, and "coca-cola" somewhere from 40 to 70 mg of caffeine. High doses can cause unpleasant side-effects such as unrest, trembling, and problems with blood pressure. A cup of coffee a day is supposedly appropriate for all people, or does not seem to have a negative effect on health.

Caffeine absorbs into the blood approximately 5 minutes after the consumption of coffee. The final effect is visible already after 30 minutes, and it lasts for hours. Caffeine does not accumulate in the body, but it is degraded and excreted from the organism within 24 hours. Caffeine is metabolized in the liver by an initial demethylation process through an enzyme, called cytochrome **P4501A2 (CYP1A2)**. The mentioned enzyme is responsible for 95 percent of caffeine metabolism. A high functional variability is characteristic of this enzyme, which is, among other, a result of differences in our genetic makeup. Genetic mutations importantly influence the efficiency of its functioning and greatly determine the rate of an individual's caffeine metabolism, which can be measured by determining the ratio of plasma (or urinary) caffeine, and the amount of metabolic products of caffeine after consuming a certain amount of coffee.



A WAY TO YOUR IDEAL BODY WEIGHT

Gene	Analysis	Role of the gene	Genotype
	Response to saturated fats	*A protein, which is the second most represented component of HDL particles. It has an important role in the HDL metabolism.*	**CT**
	Response to monounsaturated fats	*A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.*	**GG**
	Response to polyunsaturated fats	*Regulator of the synthesis of fatty acids, the oxidation, gluconeogenesis and keto-genesis.*	**CC**
	Response to carbohydrates	*A gene involved in the development of excess body weight.*	**AT**
	Response to carbohydrates	*The gene encodes the domain of the potassium channel, responsible for its selective transport through the cell membrane.*	**GG**
	Satiety	*Protein, involved in the development of excess body weight.*	**AT**
	Weight loss-regain	*A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.*	**GG**

WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

Gene	Analysis	Role of the gene	Genotype
	Vitamin B6	*Enzyme which functions in an alkaline environment and is crucial for growth and development of bones and teeth, as it is involved in the process of mineralisation, which is the process of accumulation of calcium and phosphorus. It also influences the level of vitamin B6.*	**CC**
	Vitamin B9	*Reduces 5,10-methylene-tetra-hydro-folate into methyl-tetra-hydro-folate and is, therefore, important for absorption of vitamin B9.*	**CT**
	Vitamin B12	*Protein, which influences the level of vitamin B12.*	**AG**
	Vitamin D	*Binding and transport of vitamin D and its metabolites through the body, and influencing the vitamin D level.*	**AC**
	Vitamin D	*7-dehydrocholesterol transforms vitamin D3, which is the precursor of 25-hydrox-ivitamin D3, into cholesterol, and in this way eliminates the substrate from the synthetic pathway.*	**GT**
	Vitamin D	*Transforms vitamin D into an active form, so that it can bind with the receptor for vitamin D.*	**AG**
	Iron	*Enzyme which is found on the cell surface and is involved in the uptake and recy-cling of iron.*	**GG**
	Iron	*Enzyme which is found on the cell surface. It detects the amount of iron in the body and regulates the production of protein hepcidin, which is the main iron-regulating hormone in the body.*	**GG**

WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

Gene	Analysis	Role of the gene	Genotype
	Sodium (salt)	*Gene is expressed in the liver. It activates with low pressure through renin and angiotensin converting enzyme (ACE), where angiotensin II is formed. It is in charge of the maintenance of blood pressure and electrolyte homeostasis.*	**TT**
	Sodium (salt)	*Chloride channel with 12 trans-membrane domains, which is in charge of the maintenance of blood pressure.*	**AG**
	Potassium	*Protein, which is responsible for the transport of sodium and potassium. It is included in electrolyte homeostasis and regulation of blood pressure.*	**AA**
	Vitamin E	*Apolipoprotein A5 has an important role in the regulation of the level of chylomicrons and triglycerides in the plasma. Because vitamin E is water-soluble, APOA5 through lipid concentration in the blood affects the vitamin E level.*	**CC**

THE EFFECTIVENESS OF YOUR METABOLISM

Gene	Analysis	Role of the gene	Genotype
	Alcohol metabolism	*Enzyme involved in the metabolic pathways of the breakdown of alcohol. It is responsible for an adequate alcohol metabolism.*	**GG**
	Caffeine metabolism	*Enzyme responsible for the breakdown of caffeine, alphatoxin B1 and acetaminophen. It is involved in the synthesis of cholesterol and other lipids.*	**AA**
	Lactose intolerance	*Gene that regulates the concentration of the enzyme lactase.*	**CT**
	Gluten intolerance	*This gene belongs to the HLA class II beta chain paralogs. It plays a central role in the immune system by presenting peptides derived from extracellular proteins.*	**GG**
	Gluten intolerance	*This gene belongs to the HLA class II beta chain paralogs. It plays a central role in the immune system by presenting peptides derived from extracellular proteins.*	**TT**

SPORTS AND RECREATION IN TUNE WITH YOUR GENES

Gene	Analysis	Role of the gene	Genotype
	Muscle structure	*Protein, expressed in the muscles. It binds to actin, and is, therefore, important for muscle contraction.*	**CT**
	Muscle structure	*Regulates the expression of genes, responsible for the oxidation fatty acids in the skeletal muscles and the heart muscle.*	**GG**
	Strength training	*Protein is present in the endoplasmic reticulum, where it regulates the processing of binding protein for the sterol regulatory element.*	**CG**
	Heart capacity	*CREB1 has been found to be involved in the generation of long-term cardiac memory, a process leading to adaptation of ventricular repolarization (indexed by electrocardiographic T wave) to ventricular pacing.*	**AG**

SPORTS AND RECREATION IN TUNE WITH YOUR GENES

Gene	Analysis	Role of the gene	Genotype
	Heart capacity	*ACE exerts a tonic regulatory function in circulatory homeostasis, through the synthesis of vasoconstrictor angiotensin II, which also drives aldosterone synthesis, and the degradation of vasodilator kinins.*	**CG**
	Muscle volume gene	*Growth factor that is expressed in muscle and has been demonstrated to have anabolic effects, with increased levels being linked to muscle growth in various studies.*	**CC**

GENETICALLY DETERMINED AGEING AND INFLAMMATION

Gene	Analysis	Role of the gene	Genotype
	Biological ageing	*A telomerase, whose main component is TERC, is a polymerase, which maintains the length of telomeres (chromosome endings) by adding telomere repeat TTAGGG.*	**CC**
	Inflamation sensitivity	*Interleukine-6 pro-inflammatory molecule (IL6) stimulates the immune response to training and is involved in the inflammatory repair process. It plays a role in glucose and lipid metabolism.*	**GG**
	Inflamation sensitivity	*Pro-inflammatory molecule. Elevated levels of TNF are associated with in an increase in the systemic immune response and inflammatory processes.*	**GG**
	Inflamation sensitivity	*C-Reactive Protein is involved in several host defense related functions. Consequently, the level of this protein in plasma increases greatly during acute phase response to infection or other inflammatory stimuli. It is stimulated by the IL-6 and is often used as a marker for inflammation in blood tests.*	**CT**
	Inflamation sensitivity	*IL6R gene encodes a subunit of the interleukin 6 (IL6) receptor complex. Interleukin 6 is a potent pleiotropic cytokine that regulates cell growth and differentiation and plays an important role in the immune response and inflammation.*	**AA**

CARDIOVASCULAR HEALTH

Gene	Analysis	Role of the gene	Genotype
	Omega-3 metabolism	*An enzyme encoded by this gene is involved in conversion of ALA (α-linolenic acid) omega-3 fatty acid to EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).*	**CT**
	Omega-3 and triglycerides	*An enzyme encoded by this gene is involved in conversion of ALA (α-linolenic acid) omega-3 fatty acid to EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).*	**CT**
	Insulin sensitivity	*An enzyme which processes proinsulin type I, and, therefore, has an important role in regulating the biosynthesis of insulin.*	**AA**
	Insulin sensitivity	*A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.*	**GG**
	Insulin sensitivity	*A transcription factor which is involved in the Wingless-type (Wnt) signal path through which it influences diabetes type II.*	**CC**
	Adiponectin	*A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.*	**GG**

NUTRIGENETICS GLOSSARY

- **Absorption**: uptake
- **Allele**: one of the variants of genetic material on a specific location (locus) of the chromosome. An individual has a chromosome pair where there are two alleles, which can be identical or not, and this is called homozygosis or heterozygosis. Different alleles in a human population can be the reason for inherited characteristics, such as blood type or hair colour.
- **Alkaloid**: a natural substance that is found in plants and has bitter taste.
- **Amino acid**: a basic structural unit, from which protein is built. Its formation is encoded in DNA with three sequential nucleotides, which in different combinations give different amino acids: GCU is the code for amino acid alanine, UGU for cysteine…
- **Anticarcinogenic**: prevents the development of cancer.
- **Antioxidants**: substances which protect us from oxidative stress.
- **Artery**: a blood vessel that carries blood away from the heart. The main artery is the aorta.
- **BMI**: body mass index. Body mass divided by the square of body height (kg/m2).
- **Carbohydrates**: apart from proteins and fats, it is the main macronutrient. It is the basic source of energy.
- **Caucasians**: term, generally used in scientific articles for members of the white race.
- **Cell respiration**: a basic process where energy, carbon dioxide and water are formed from glucose and oxygen.
- **Chromosome**: a stick-like form of DNA molecule, which encodes hundreds or thousands of genes. In the nucleus, there are 22 autosomal chromosome pairs, and 2 sex determining chromosomes. In addition to the molecules of DNA, there are also proteins (mostly histones) present, around which the DNA is coiled. Such coiling and further formation results in a tightly formed chromosome, which takes up less space than an uncoiled molecule.
- **Chromosome (autosomal)**: a chromosome, where both in the chromosomal pair are similar. One chromosome out of the pair is given to an individual by his father and the other chromosome from his mother.
- **Chromosome (sex)**: there are X (female) and Y (male) chromosomes existing. Women have a pair of two X chromosomes (XX) and men have an X and Y chromosome (XY), from which Y is inherited only from the father. Its presence/absence determines the sex of the child.
- **Chylomicron**: it helps cholesterol in passing through the intestinal mucus, and it contains a minimal amount of cholesterol and triglycerides.
- **Cofactor**: non-protein compound, bound on a protein, and is necessary for protein's biological activity.

- **Common variant (copy) of the gene**: DNA sequence of analysed locus, which contains a nucleotide that is more common in a population (its frequency is higher than 50 percent).
- **Complex carbohydrates**: compound carbohydrates, which are slowly digested, and energy is provided for a long time, which makes us feel satiety longer. The increase of blood sugar level is slow, and not rapid, as in simple carbohydrates.
- **Detoxification**: the process of removing harmful substances.
- **Diabetes**: a chronic state in which pancreatic cells do not produce enough insulin or the body cannot effectively use the produced insulin.
- **Dimethylation**: the addition of two methyl compounds.
- **DNA**: a molecule, found in the cell nucleus, which carries the instructions for the development of an organism. Human DNA is consisted of four different nucleotides and has the form of a double-helix coil. This means that two chains of DNA, which are anti-parallel and coil around one another. Anti-parallel means that the nucleotide C is always paired with G, and A always with T.
- **Enzyme**: a protein involved in chemical processes in the body. Its purpose is to reduce the activation energy required for chemical reactions and thus facilitating their course. This enables faster conversion of substrate to product, for example, conversion of starch into glucose.
- **Essential fats**: plant fats, necessary for our body.
- **Fats**: important constituents and an energy source, which contains twice the amount of energy of carbohydrates or proteins.
- **Fibres**: indigestible carbohydrates, which are in charge of a good digestion and the feeling of satiety. They include cellulose, lignin and pectin.
- **Free radicals**: instable chemical substances, which harm the cell.
- **Gene**: Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents to their descendants, and give information, which is needed for the formation and development of an organism.
- **Genetic analysis**: review, or the analysis of your genes.
- **Genetic makeup**: is a general term, which is usually a synonym for genotype, or variant of the DNA gene sequence. However, the term can refer also to the region of the genome, where the gene is not present.
- **Genetic risk**: risk for, for example, excess body weight, lack of a vitamin or a mineral, which is determined by your genes.
- **Genome**: the entire DNA which is present in the cell nucleus, and includes all the autosomal chromosomes, and both sex chromosomes.
- **Genotype**: allele variants of a gene, present in an individual. Genotype can represent all of the alleles in a cell, but mostly it is used for describing one or more genes, which together influence a certain characteristic.
- **Glycemic index**: it indicates how much certain food increases blood sugar (it does not consider the amount of food).
- **Glycemic load**: it indicates how much certain food increases blood sugar (it considers the amount of food).
- **Glycogen**: the basic structural form of glucose storage in our body.
- **Glucose**: the basic representative of carbohydrates, also called blood sugar.
- **Hydrogenised fats**: are trans fats, which are formed with heating of plant oils on high temperatures.
- **Hypothalamus**: is cherry-size part in the middle of the brain, and it is the centre off all information concerning endocrine hormones.
- **Insulin**: a hormone that regulates blood sugar level.
- **Insulin resistance**: the state of our body being irresponsive to insulin, the hormone that regulates blood sugar level.
- **Kcal**: kilo calorie, in lay terms, simply calories.
- **Lactose**: milk sugar, consisting of glucose and galactose.

- **LDL cholesterol**: harmful for our health and this is why its level should be as low as possible.
- **Lipolysis**: the process of fat metabolism.
- **Lipoprotein particles**: Bind cholesterol and transport it through the body.
- **Macronutrient**: group, consists of carbohydrates, proteins and fats (saturated, monounsaturated, polyunsaturated).
- **Metabolism**: process of the breakdown, or formation of new substances in the body.
- **Micronutrients**: nutrients our body needs in small quantities, but are nevertheless vital to our health. This includes vitamins and minerals.
- **Monounsaturated fats**: an extremely beneficial type of fatty acids.
- **Monosaccharide**: the most basic and simple carbohydrate. For example: glucose, fructose, mannose…
- **Muscle fibres**: cells that form muscles. Their name is due to their elongated shape.
- **Mutation**: a random change in the genetic material. Deletions are mutations where nucleotides on a part of genetic material are erased (deleted), insertions, where there is an insertion of nucleotides on a part of genetic material, and substitution, where nucleotides are replaced with other nucleotides.
- **Myoglobin**: transports and stores oxygen in muscles.
- **Nucleotide**: the basic unit of our DNA. Each unit consists of a phosphate group, pentose (sugar with five carbons in the ring) and nitrogenous bases. Between individual nucleotides only the nitrogenous bases differ. In human DNA there are four different nitrogenous bases (Cytosine (C), Guanine (G), Thymine (T) and Adenosine (A)) and, consequently, four different nucleotides.
- **Phenotypic features**: the composite of an organism's observable characteristics or traits, such as eye colour.
- **Polymorphism**: the presence of two or more different alleles of one gene in the population. The result of this is the presence of several phenotypes. However, a different allele has to be present in more than one percent of the population to be called polymorphism.
- **Polyunsaturated fats**: a very beneficial type of fatty acids. They include omega-3 and omega-6 fatty acids.
- **Probiotic yoghurt**: contains lactic acid bacteria, which help regulate digestion.
- **Refined**: purified, industrially processed, and it unfavourably influences our health.
- **Rare variant (copy) of a gene**: DNA sequence of analysed locus, which contains a nucleotide that is rarer in the population (its frequency is lower than 50 percent).
- **Reactive oxygen species**: highly reactive free radicals, which contain oxygen.
- **Saturated fats**: mainly animal fats, also called "bad fats" because they are increasing cholesterol levels.
- **SNP (Single Nucleotide Polymorphism)**: polymorphism at specific DNA site (locus), which occurs because of the substitution of one nucleotide with another (i.e. A -> C). It represents a variation in the genetic makeup, which differs among people. These variations can be numerous, because there are approximately 10 million SNPs in the human genome. The mentioned substitutions express in phenotypical differences (illnesses, characteristics) among individual people.
- **Tannins**: a plant polyphenolic compound with bitter taste. Tannins are notably found naturally occurring in grapes, tea leaves and oak.
- **Types of fats**: in essence, we differentiate animal saturated fats and plant mono- and polyunsaturated fats.
- **Trans fats**: known also as hydrogenated or bad fats, which are produced as a result of overheating oil. They increase bad cholesterol and reduce the good one.
- **Triglycerides**: structural form in which our body stores fat. A high triglyceride level in the blood is not healthy and it is related to numerous medical conditions.
- **Unsaturated fats**: fats of vegetable origin, exceptions are coconut and palm oil.

SPORTS GENETICS GLOSSARY

- **Absolute Strength**: it refers to ability of moving objects, expressed in terms of absolute weight. For example: "She can squat 80 kilos for one repetition".
- **Continuous training**: the training that involves low to moderate intensity activity without rest intervals: walking, cycling, running, swimming.
- **Endurance (strength/muscular endurance)**: strength endurance is the ability to execute a high number of repetitions with a given weight or to sustain a static muscular contraction for a long period of time.
- **Explosive strength**: the ability to express strength in a very fast manner.
- **Heart Rate**: number of heart contractions per minute.
- **Hypertrophy**: the term, related to cell growing, used when talking about muscle growth or fat cells volume changes.
- **Intensity**: the level of exertion. Or, "how hard is the effort, relatively to one's maximal capacity". In the endurance field, intensity usually refers to a given percent of the maximal heart rate (e.g. 70%HRmax for a moderate Intensity). In the strength training field it is usually presented by RM (repetitions maximum).
- **Interval training**: training that combines bouts of moderate to high intensity performance with rest periods between them. The intensity of the bouts and the recovery time should be well planned and depend on the final goal of the training.
- **Maximal strength**: the maximal weight one can lift in a given movement pattern.
- **Plyometric exercise**: the exercise that engages the so called "short-stretching cycle". Some examples: hoops, landing to jumping transition, medicine ball drills.
- **Power**: the mechanical work (W) done in a certain period of time (t), or W/t. The units of power are "Watts". As work equals force times distance (d), or F*d, Power turns to be Force*Speed (d/t) or, applying to an athlete's ability and formulated in an accessible language - Power is the ability to express force in a fast manner.
- **Prehab**: a term, used to define a set of activities that aim to take care of known intrinsic (related to a person) injury risk factors. Some of the risk factors cannot be treated by an exercise intervention, but others definitely can. Among the risk factors that can be accessed and treated by exercise are: inadequate range of motion; strength, timing and motor control deficits, asymmetry and low aerobic fitness. Usually those Prehab interventions are prescribed after an appropriate screening procedure and are extremely personal, according to the activities the person takes part in and matching their personal characteristics. The athlete is guided to perform the set of exercises (self-myofascial release, mobility drills,

stretching, strengthening, aerobics etc.) as a special warm-up routine or as an additional training session itself.

- **Rate of Perceived Exertion (RPE)**: an alternative way to measure the intensity of the training effort. The person evaluates his own level of effort by grading it on the 6-20 scale (BORG scale) or 0-10 (OMNI scale). Researchers have found that a high correlation exists between subjectively evaluated level of exertion and the scientifically measured one (%HRmax or %VO2Max).
- **Relative Strength**: it describes capability to execute Body Weight exercise (e.g. chin up, hand stand push-ups...) or to move external objects, when the weight is expressed relatively to his/her body weight. For example: "He can Deadlift 2 times his body weight" (2BW).
- **Resting heart rate (RHR)**: the number of heart beats per minute in a seated posture, measured after a rest period. When you wake up in the morning, sit on your bed and count the heart rate (beats per minute) before you get involved in any kind of activity.
- **RM (Repetitions Maximum)**: the maximal number of repetitions that may be executed with a "strict form" in a given exercise. For example, if someone's RM10 for Back Squat is 80 kg, this means that a person can lift an 80 kg barbell 10 times. RM1 refers to the maximal Intensity, (the weight that can be lifted only one time).
- **Strength**: the term is usually used to describe one's ability to apply force to external objects.
- **Stroke Volume**: the amount of blood that is pumped out from the heart to aorta with a single heart contraction.
- **Training Methods**: among the most widely used methods are: continuous training and interval training. Other training methods are a variation or a combination of these two. Some forms of the methods are: tempo, fartlek, HIIT, circuit training and time or volume dependent Density training (AMRAP, AFAP...).
- **Training Principles**: the principle of training designed for the achievement of the desired goals. The established principles are universal, but their applications should be adapted for the given field and person. Most of the principles are grounded in sport science and approved by time. The most well-known principles are: overload principle, specificity principle, individualization principle, reversibility principle and diminishing returns principle.
- **Weight/Resistance Training**: any type of training with an external resistance/load, aimed to develop various types of strength (maximal strength, strength endurance, explosive strength...) or to "build" muscle tissue. The volume, the intensity and the manner of exercise execution will define the main outcome of resistance training.

CEREALS AND STARCHY FOODS

Food (100 g)	Food (general portion)	Calories	Proteins	Carbohydrates	Saturated fats	Monounsaturated fats	Polyunsaturated fats	Cholesterol	B6
Amaranth	half a cup	371	13,6 g	65,7 g	1,50 g	1,70 g	2,80 g	0 mg	0,6 mg
Amaranth, cooked	5 tablespoons	102	3,8 g	18,7 g	~	~	~	0 mg	0,1 mg
Barley	half a cup	352	9,9 g	77,7 g	0,20 g	0,10 g	0,60 g	0 mg	0,3 mg
Barley flakes or flour	3 tablespoons	345	10,5 g	74,5 g	0,30 g	0,20 g	0,80 g	0 mg	0,4 mg
Barley, cooked	5 tablespoons	123	2,3 g	28,2 g	0,10 g	0,10 g	0,20 g	0 mg	0,1 mg
Bread, buckwheat	2 pieces	256	7,9 g	51,4 g	0,34 g	0,62 g	0,50 g	0 mg	0,3 mg
Bread, corn	2 pieces	314	7,2 g	48,1 g	2,70 g	5,10 g	1,20 g	0 mg	0,1 mg
Bread, oat	2 pieces	236	10,4 g	39,8 g	0,70 g	1,60 g	1,70 g	0 mg	0,1 mg
Bread, rye	2 pieces	258	8,5 g	48,3 g	0,60 g	1,30 g	0,80 g	0 mg	0,1 mg
Bread, spelt	2 pieces	333	12,0 g	65,7 g	0,24 g	0,54 g	1,18 g	0 mg	0,4 mg
Bread, white	2 pieces	266	7,6 g	50,6 g	0,70 g	0,70 g	1,40 g	0 mg	0,1 mg
Coconut flakes	1 cup	456	3,1 g	51,8 g	26,40 g	1,40 g	0,20 g	0 mg	0,0 mg
Corn flakes	3/4 a cup	360	6,7 g	86,7 g	0,00 g	0,00 g	0,10 g	0 mg	1,8 mg
Corn polenta, instant	half a cup	371	8,8 g	79,6 g	0,20 g	0,30 g	0,50 g	0 mg	0,1 mg
Khorasan wheat	half a cup	337	14,7 g	70,4 g	0,20 g	0,20 g	0,60 g	0 mg	0,3 mg
Khorasan wheat, cooked	3/4 a cup	146	6,5 g	30,5 g	0,10 g	0,1 g	0,24 g	0 mg	0,1 mg
Macaroni, plain, cooked	3/4 a cup	158	5,8 g	30,9 g	0,20 g	0,10 g	0,30 g	0 mg	0,0 mg
Macaroni, whole wheat, cooked	3/4 a cup	124	5,3 g	26,5 g	0,10 g	0,10 g	0,20 g	0 mg	0,1 mg
Oat flakes	4 tablespoons	375	12,7 g	68,2 g	1,50 g	2,10 g	2,40 g	0 mg	1,6 mg
Potato, baked	1 medium potato	93	2,0 g	21,5 g	0,00 g	0,00 g	0,00 g	0 mg	0,3 mg
Potato, cooked	1 medium potato	87	1,9 g	20,1 g	0,00 g	0,00 g	0,00 g	0 mg	0,3 mg
Rice bran	1 cup	316	13,3 g	49,7 g	4,20 g	7,50 g	7,50 g	0 mg	4,1 mg
Rice, brown	half a cup	362	7,5 g	76,2 g	0,50 g	1,00 g	1,00 g	0 mg	0,5 mg
Rice, white	half a cup	360	6,6 g	79,3 g	0,20 g	0,20 g	0,20 g	0 mg	0,1 mg
Spaghetti, plain, cooked, without salt	3/4 a cup	158	5,8 g	30,9 g	0,20 g	0,10 g	0,30 g	0 mg	0,0 mg
Spaghetti, whole wheat, cooked, without salt	3/4 a cup	124	5,3 g	26,5 g	0,10 g	0,10 g	0,20 g	0 mg	0,1 mg
Spelt	5 tablespoons	338	14,6 g	71,4 g	0,40 g	0,40 g	1,30 g	0 mg	0,2 mg
Tofu	1 slice	271	17,3 g	10,5 g	2,90 g	4,50 g	11,40 g	0 mg	0,1 mg
Wheat germ	1 cup	360	23,1 g	51,8 g	1,70 g	1,40 g	6,00 g	0 mg	1,3 mg
Wheat, plain	half a cup	340	10,7 g	75,4 g	0,40 g	0,20 g	0,80 g	0 mg	0,4 mg

CEREALS AND STARCHY FOODS

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magnesium	Manganese	Sodium	Zinc
82 mcg	0,0 mcg	0,0 mcg	4 mg	1,20 mg	7,6 mg	508 mg	18,7 mcg	159 mg	248 mg	3,3 mg	4 mg	2,90 mg
22 mcg	0,0 mcg	0,0 mcg	4 mg	0,20 mg	2,1 mg	135 mg	5,5 mcg	47 mg	65 mg	0,9 mg	6 mg	0,90 mg
23 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	2,5 mg	280 mg	37,7 mcg	29 mg	79 mg	1,3 mg	9 mg	2,10 mg
8 mcg	0,0 mcg	0,0 mcg	0 mg	0,60 mg	2,7 mg	4 mg	37,7 mcg	32 mg	96 mg	1,0 mg	4 mg	2,00 mg
16 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	1,3 mg	93 mg	8,6 mcg	11 mg	22 mg	0,3 mg	3 mg	0,80 mg
43 mcg	0,0 mcg	0,0 mcg	1 mg	0,22 mg	1,3 mg	166 mg	2,5 mcg	19 mg	95 mg	1,0 mg	57 mg	~
55 mcg	0,2 mcg	~	0 mg	~	1,9 mg	128 mg	9,9 mcg	73 mg	20 mg	0,2 mg	778 mg	0,60 mg
81 mcg	0,0 mcg	~	0 mg	0,40 mg	3,1 mg	147 mg	30,0 mcg	65 mg	35 mg	0,8 mg	407 mg	0,90 mg
110 mcg	0,0 mcg	~	1 mg	0,30 mg	2,8 mg	166 mg	30,9 mcg	73 mg	40 mg	0,8 mg	660 mg	1,10 mg
64 mcg	0,0 mcg	0,0 mcg	0 mg	0,98 mg	3,4 mg	418 mg	0,2 mcg	29 mg	119 mg	0,0 mg	579 mg	2,60 mg
111 mcg	0,0 mcg	0,0 mcg	0 mg	0,20 mg	3,7 mg	100 mg	17,3 mcg	151 mg	23 mg	0,5 mg	681 mg	0,70 mg
3 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	1,5 mg	361 mg	16,1 mcg	11 mg	51 mg	1,0 mg	285 mg	~
357 mcg	5,4 mcg	3,6 mcg	0 mg	0,30 mg	19,3 mg	117 mg	5,1 mcg	3 mg	16 mg	0,1 mg	949 mg	1 mg
5 mcg	0,0 mcg	0,0 mcg	0 mg	~	1,0 mg	137 mg	17,0 mcg	2 mg	27 mg	0,1 mg	1 mg	~
~	~	0,0 mcg	0 mg	0,60 mg	4,4 mg	446 mg	69,3 mcg	24 mg	134 mg	2,9 mg	6 mg	3,70mg
12 mcg	0,0 mcg	0,0 mcg	0 mg	~	2,0 mg	220 mg	~	10 mg	56 mg	1,2 mg	6 mg	1,80 mg
7 mcg	0,0 mcg	~	0 mg	0,10 mg	0,5 mg	44 mg	26,4 mcg	7 mg	18 mg	0,3 mg	1 mg	0,50 mg
5 mcg	0,0 mcg	~	0 mg	0,30 mg	1,1 mg	44 mg	25,9 mcg	15 mg	30 mg	1,4 mg	3 mg	0,80 mg
286 mcg	0,0 mcg	0,0 mcg	0 mg	0,50 mg	29,3 mg	359 mg	26,8 mcg	352 mg	138 mg	2,9 mg	258 mg	2,20 mg
9 mcg	0,0 mcg	0,0 mcg	13 mg	0,00 mg	0,4 mg	391 mg	0,3 mcg	5 mg	25 mg	0,2 mg	5 mg	0,30 mg
10 mcg	0,0 mcg	0,0 mcg	13 mg	0,00 mg	0,3 mg	379 mg	0,3 mcg	5 mg	33 mg	0,1 mg	4 mg	0,30 mg
63 mcg	0,0 mcg	0,0 mcg	0 mg	4,90 mg	18,5 mg	1485 mg	15,6 mcg	57 mg	781 mg	14,2 mg	5 mg	6,00 mg
20 mcg	0,0 mcg	0,0 mcg	0 mg	1,2 mg	1,8 mg	268 mg	23,4 mcg	33 mg	143 mg	3,7 mg	4 mg	2,00 mg
9 mcg	0,0 mcg	0,0 mcg	0 mg	1,0 mg	0,8 mg	86 mg	15,1 mcg	9 mg	35 mg	1,1 mg	1 mg	1,10 mg
7 mcg	0,0 mcg	0,0 mcg	0 mg	0,10 mg	1,3 mg	44 mg	26,4 mcg	7 mg	18 mg	0,3 mg	1 mg	0,50 mg
5 mcg	0,0 mcg	0,0 mcg	0 mg	0,30 mg	1,1 mg	44 mg	25,9 mcg	15 mg	30 mg	1,4 mg	3 mg	0,80 mg
45 mcg	0,0 mcg	~	0 mg	0,80 mg	4,4 mg	388 mg	11,7 mcg	27 mg	136 mg	3,0 mg	8 mg	3,30 mg
27 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	4,9 mg	146 mg	28,5 mcg	372 mg	60 mg	1,5 mg	16 mg	2,00 mg
281 mcg	0,0 mcg	0,0 mcg	0 mg	22,00 mg	6,3 mg	892 mg	79,2 mcg	39 mg	239 mg	13,3 mg	12 mg	12,30 mg
41 mcg	0,0 mcg	0,0 mcg	0 mg	1,00 mg	5,4 mg	435 mg	2,1 mcg	34 mg	90 mg	3,4 mg	2 mg	2,70 mg

FRUITS

Food (100 g)	Food (general portion)	Calories	Proteins	Carbohydrates	Saturated fats	Monounsaturated fats	Polyunsaturated fats	Cholesterol	B6
Apple	1 small fruit	52	0,3 g	11,4 g	0,21 g	0,02 g	0,25 g	0 mg	0,0 mg
Apricots, dried	1 cup	241	3,4 g	62,6 g	0,00 g	0,10 g	0,10 g	0 mg	0,1 mg
Avocado	half of the fruit	160	2,0 g	8,5 g	2,10 g	9,80 g	1,80 g	0 mg	0,3 mg
Banana	1 fruit	89	1,1 g	22,8 g	0,10 g	0,00 g	0,10 g	0 mg	0,4 mg
Black currants	1 cup	63	1,4 g	15,4 g	0,00 g	0,10 g	0,20 g	0 mg	0,1 mg
Blueberries	1 cup	57	0,7 g	14,5 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Cherry, red	2/3 cup, pitted	63	1,1 g	16,0 g	0,07 g	0,08 g	0,10 g	0 mg	0,0 mg
Cranberries, dried	2,5 cup	308	0,1 g	82,4 g	0,10 g	0,20 g	0,70 g	0 mg	0,0 mg
Figs, dried	5 figs	249	3,3 g	63,9 g	0,10 g	0,20 g	0,30 g	0 mg	0,1 mg
Grapefruit	1 small fruit	34	0,6 g	7,4 g	0,03 g	0,03 g	0,06 g	0 mg	0,0 mg
Japanese Persimmon	1 fruit	70	0,6 g	16,0 g	0,05 g	0,09 g	0,06 g	0 mg	0,1 mg
Kiwi	2 fruits	61	1,1 g	14,7 g	0,03 g	0,05 g	0,30 g	0 mg	0,1 mg
Lemon	1 fruit	29	1,1 g	9,3 g	0,13 g	0,04 g	0,10 g	0 mg	0,1 mg
Mandarin	1 medium fruit	53	0,8 g	13,3 g	0,00 g	0,10 g	0,10 g	0 mg	0,1 mg
Melons	2/3 cup	34	0,8 g	8,8 g	0,10 g	0,00 g	0,10 g	0 mg	0,1 mg
Nectarine	1 small fruit	44	1,0 g	10,6 g	0,03 g	0,09 g	0,11 g	0 mg	0,0 mg
Olives, canned	12 tablespoons	145	1,0 g	3,8 g	2,00 g	11,30 g	1,30 g	0 mg	0,0 mg
Orange	1 small fruit	39	1,0 g	8,3 g	0,03 g	0,06 g	0,08 g	0 mg	0,1 mg
Peaches	1 small fruit	39	0,9 g	9,9 g	0,00 g	0,10 g	0,10 g	0 mg	0,0 mg
Pear	half of the fruit	62	0,2 g	15,0 g	0,04 g	0,07 g	0,13 g	0 mg	0,0 mg
Pineapple	2 thin slices	54	0,5 g	13,1 g	0,02 g	0,03 g	0,08 g	0 mg	0,1 mg
Plums	3 fruits	69	0,6 g	11,4 g	0,02 g	0,05 g	0,08 g	0 mg	0,0 mg
Rasberries	2/3 cup	52	1,2 g	11,9 g	0,00 g	0,10 g	0,40 g	0 mg	0,1 mg
Redcurrants	1 cup	26	1,1 g	13,8 g	0,04 g	0,03 g	0,07 g	0 mg	0,1 mg
Strawberries	half a cup, chopped	32	0,6 g	6,9 g	0,32 g	0,06 g	0,24 g	0 mg	0,0 mg
Watermelon	2/3 cup	38	0,6 g	8,3 g	0,05 g	0,03 g	0,07 g	0 mg	0,0 mg

VEGETABLES, LEGUMES

Artichoke	1 medium piece	47	3,3 g	10,5 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Asparagus	5 big asparagus	20	2,2 g	4,0 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Beet, pickled	3/4 cup	65	0,8 g	16,3 g	0,00 g	0,00 g	0,00 g	0 mg	0,1 mg
Bell pepper, green	1 medium size	20	0,9 g	4,6 g	0,10 g	0,00 g	0,10 g	0 mg	0,2 mg

FRUITS

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magnesium	Manganese	Sodium	Zinc
3 mcg	0,0 mcg	0,0 mcg	5 mg	0,20 mg	0,1 mg	107 mg	0,0 mcg	6 mg	5 mg	0,0 mg	1 mg	0,00 mg
10 mcg	0,0 mcg	0,0 mcg	1 mg	4,30 mg	2,7 mg	1162 mg	2,2 mcg	55 mg	32 mg	0,2 mg	10 mg	0,29 mg
81 mcg	0,0 mcg	0,0 mcg	10 mg	2,10 mg	0,5 mg	485 mg	0,4 mcg	12 mg	29 mg	0,1 mg	7 mg	0,64 mg
20 mcg	0,0 mcg	0,0 mcg	9 mg	0,10 mg	0,3 mg	358 mg	1,0 mcg	5 mg	27 mg	0,3 mg	1 mg	0,15 mg
8,8 mcg	0,0 mcg	0,0 mcg	181 mg	1,00 mg	1,5 mg	322 mg	1,7 mcg	55 mg	24 mg	0,3 mg	2 mg	0,27 mg
6 mcg	0,0 mcg	0,0 mcg	10 mg	0,60 mg	0,3 mg	77 mg	0,1 mcg	6 mg	6 mg	0,3 mg	1 mg	0,17 mg
4 mcg	0,0 mcg	0,0 mcg	7 mg	0,10 mg	0,4 mg	222 mg	0,0 mcg	13 mg	11 mg	0,1 mg	0 mg	0,10 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	1,10 mg	0,5 mg	40 mg	0,5 mcg	10 mg	5 mg	0,3 mg	3 mg	0,10 mg
9 mcg	0,0 mcg	0,0 mcg	1 mg	0,40 mg	2,0 mg	680 mg	0,6 mcg	162 mg	1 mg	0,5 mg	10 mg	0,60 mg
10 mcg	0,0 mcg	0,0 mcg	33 mg	0,10 mg	0,1 mg	148 mg	1,4 mcg	12 mg	9 mg	0,0 mg	0 mg	0,07 mg
8 mcg	0,0 mcg	0,0 mcg	8 mg	0,70 mg	0,2 mg	161 mg	0,6 mcg	8 mg	9 mg	0,4 mg	1 mg	0,10 mg
25 mcg	0,0 mcg	0,0 mcg	93 mg	1,50 mg	0,3 mg	312 mg	0,2 mcg	34 mg	17 mg	0,1 mg	3 mg	0,10 mg
11 mcg	0,0 mcg	0,0 mcg	53 mg	0,20 mg	0,6 mg	138 mg	0,4 mcg	26 mg	8 mg	0 mcg	2 mg	0,06 mg
16 mcg	0,0 mcg	0,0 mcg	27 mg	0,20 mg	0,2 mg	166 mg	0,1 mcg	37 mg	12 mg	0,0 mg	2 mg	0,07 mg
21 mcg	0,0 mcg	0,0 mcg	37 mg	0,10 mg	0,2 mg	267 mg	0,4 mcg	9 mg	12 mg	0,0 mg	16 mg	0,20 mg
5 mcg	0,0 mcg	0,0 mcg	5 mg	0,80 mg	0,3 mg	201 mg	0,0 mcg	6 mg	9 mg	0,1 mg	0 mg	0,17 mg
3 mcg	0,0 mcg	0,0 mcg	0 mg	3,80 mg	0,5 mg	42 mg	0,9 mcg	52 mg	11 mg	0,0 mg	1556 mg	0,20 mg
30 mcg	0,0 mcg	0,0 mcg	53 mg	0,20 mg	0,1 mg	181 mg	0,5 mcg	40 mg	10 mg	0,0 mg	0 mg	0,07 mg
4 mcg	0,0 mcg	0,0 mcg	7 mg	0,70 mg	0,3 mg	190 mg	0,1 mcg	6 mg	9 mg	0,1 mg	0 mg	0,17 mg
7 mcg	0,0 mcg	0,0 mcg	4 mg	0,10 mg	0,2 mg	119 mg	0,1 mcg	9 mg	7 mg	0,0 mg	1 mg	0,10 mg
18 mcg	0,0 mcg	0,0 mcg	48 mg	0,00 mg	0,3 mg	109 mg	0,1 mcg	13 mg	12 mg	0,9 mg	1 mg	0,12 mg
5 mcg	0,0 mcg	0,0 mcg	10 mg	0,30 mg	0,2 mg	157 mg	0,0 mcg	6 mg	7 mg	0,1 mg	0 mg	0,10 mg
21 mcg	0,0 mcg	0,0 mcg	26 mg	0,90 mg	0,7 mg	151 mg	0,2 mcg	25 mg	22 mg	0,7 mg	1 mg	0,42 mg
8 mcg	0,0 mcg	0,0 mcg	41 mg	0,10 mg	1,0 mg	275 mg	0,6 mcg	33 mg	13 mg	0,2 mg	1 mg	0,23 mg
24 mcg	0,0 mcg	0,0 mcg	59 mg	0,30 mg	0,4 mg	153 mg	0,4 mcg	16 mg	13 mg	0,4 mg	1 mg	0,14 mg
3 mcg	0,0 mcg	0,0 mcg	8 mg	0,10 mg	0,2 mg	112 mg	0,4 mcg	7 mg	10 mg	0,0 mg	1 mg	0,10 mg

VEGETABLES, LEGUMES

68 mcg	0,0 mcg	0,0 mcg	12 mg	0,20 mg	1,3 mg	370 mg	0,2 mcg	44 mg	60 mg	0,3 mg	94 mg	0,40 mg
52 mcg	0,0 mcg	0,0 mcg	6 mg	1,10 mg	2,1 mg	202 mg	2,3 mcg	24 mg	14 mg	0,2 mg	2 mg	0,54 mg
27 mcg	0,0 mcg	0,0 mcg	2 mg	0,10 mg	0,4 mg	148 mg	1,0 mcg	11 mg	15 mg	0,2 mg	264 mg	0,30 mg
10 mcg	0,0 mcg	0,0 mcg	80 mg	0,40 mg	0,3 mg	175 mg	0,0 mcg	10 mg	10 mg	0,1 mg	3 mg	0,13 mg

Alcohol metabolism
Martínez et al. (2010). Variability in ethanol biodisposition in whites is modulated by polymorphisms in the ADH1B and ADH1C genes. Hepatology 51(2): 491-500
Yokoyama et al. (2005). Hangover susceptibility in relation to aldehyde dehydrogenase-2 genotype, alcohol flushing, and mean corpuscular volume in Japanese workers. Alcohol Clin Exp Res 29(7): 1165-1171

Caffeine metabolism
Cornelis et al. (2006). Coffee, CYP1A2 genotype, and risk of myocardial infarction. JAMA 295(10): 1135-1141
Palatini et al. (2009). CYP1A2 genotype modifies the association between coffee intake and the risk of hypertension. J Hypertens 27(8): 1594-1601

Lactose intolerance
Bersaglieri et al. (2004). Genetic signatures of strong recent positive selection at the lactase gene. Am J Hum Genet 74(6): 1111-1120
Enattah et al. (2002). Identification of a variant associated with adult-type hypolactasia. Nat Genet 30(2): 233-237
Kerber et al. (2007). Hydrogen breath testing versus LCT genotyping for the diagnosis of lactose intolerance: a matter of age? Clin Chim Acta 383(1-2): 91-96
Krawczyk et al. (2008). Concordance of genetic and breath tests for lactose intolerance in a tertiary referral centre. J Gastrointestin Liver Dis 17(2): 135-139
Nagy et al. (2009). Prevalence of adult-type hypolactasia as diagnosed with genetic and lactose hydrogen breath tests in Hungarians. Eur J Clin Nutr 63(7): 909-912

Gluten intolerance
Hunt et al. (2008). Newly identified genetic risk variants for celiac disease related to the immune response. Nat Genet. 40(4): 395-402.
van Heel et al. (2007). A genome-wide association study for celiac disease identifies risk variants in the region harboring IL2 and IL21. Nat Genet. 39(7): 827-829.
Monsuur et al. (2008). Effective detection of human leukocyte antigen risk alleles in celiac disease using tag single nucleotide polymorphisms. PLoS One. 3(5):e2270
Zhernakova et al. (2011). Meta-analysis of genome-wide association studies in celiac disease and rheumatoid arthritis identifies fourteen non-HLA shared loci. PLoS Genet. 7(2): e1002004

Muscle structure
Ahmetov et al. (2006). PPARalpha gene variation and physical performance in Russian athletes. Eur J Appl Physiol 97(1): 103-108
Eynon et al. (2010). Do PPARGC1A and PPARalpha polymorphisms influence sprint or endurance phenotypes? Scand J Med Sci Sports. 20(1):e145-50.
Eynon et al. (2012). The ACTN3 R577X polymorphism across three groups of elite male European athletes. PLoS One 7(8): e43132
Kikuchi et al. (2016). ACTN3 R577X genotype and athletic performance in a large cohort of Japanese athletes. Eur J Sport Sci 16(6): 694-701
Kikuchi et al. (2015). The ACTN3 R577X genotype is associated with muscle function in a Japanese population. Appl Physiol Nutr Metab 40(4): 316-322
Papadimitriou et al. (2016). ACTN3 R577X and ACE I/D gene variants influence performance in elite sprinters: a multi-cohort study. BMC Genomics. 17(1): 285
Yang et al. (2003). ACTN3 genotype is associated with human elite athletic performance. Am J Hum Genet 73(3): 627-631

Inflammation
Jianf et al. (2010). Interleukin-6 receptor gene polymorphism modulates interleukin-6 levels and the metabolic syndrome: GBCS-CVD. Obesity (Silver Spring) 18(10): 1969-1974
Kardys et al. (2006). C-reactive protein gene haplotypes and risk of coronary heart disease: the Rotterdam Study. Eur Heart J 27(11): 1331-1337
Mori and Beilin. (2004). Omega-3 Fatty Acids and Inflammation. Curr Atheroscler Rep. 6(6): 461-467
Pai et al. (2008). C-Reactive Protein (CRP) Gene Polymorphisms, CRP Levels, and Risk of Incident Coronary Heart Disease in Two Nested Case-Control Studies. PLoS One 3(1): e1395
Scheller et al. (2011). The pro- and anti-inflammatory properties of the cytokine interleukin-6. Biochim Biophys Acta 1813(5): 878-888.
Simopoulos. (2002). Omega-3 Fatty Acids in Inflammation and Autoimmune Diseases. J Am Coll Nutr 21(6): 495-505
Vargas et al. (2013). Influence of the 48867A>C (Asp358Ala) IL6R polymorphism on response to a lifestyle modification intervention in individuals with metabolic syndrome. Genet Mol Res 2(3): 3983-3991.
Walston et al. (2010). Inflammation and stress-related candidate genes, plasma interleukin-6 levels, and longevity in older adults. Exp Gerontol 44(5): 350–355.
Wypasek et al. (2015). Association of the C-Reactive Protein Gene (CRP) rs1205 C>T Polymorphism with Aortic Valve Calcification in Patients with Aortic Stenosis. Int J Mol Sci 16(10): 23745–23759

Omega-3 and triglycerides
AlSaleh et al. (2014). Genetic predisposition scores for dyslipidaemia influence plasma lipid concentrations at baseline, but not the changes after controlled intake of n-3 polyunsaturated fatty acids. Genes Nutr 9(4): 412
Bradberry and Hilleman (2013). Overview of Omega-3 Fatty Acid Therapies. P T 38(11): 681–691
Dumont et al. (2011). FADS1 genetic variability interacts with dietary α-linolenic acid intake to affect serum non-HDL-cholesterol concentrations in European adolescents. J Nutr 141(7): 1247-1253
Lu et al. (2010). Dietary n-3 and n-6 polyunsaturated fatty acid intake interacts with FADS1 genetic variation to affect total and HDL-cholesterol concentrations in the Doetinchem Cohort Study. Am J Clin Nutr 92(1): 258-265
Harris and Bulchandani (2006). Why do omega-3 fatty acids lower serum triglycerides? Curr Opin Lipidol 17(4): 387-393

MYGENE**HUB**