



Mijnlabtest.nl

# Nutri-Gene

## Analyse & Rapportage

Mevr. Test Subject

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The book of life...

Geachte mevrouw test subject,

Bij deze willen wij u feliciteren met de belangrijke stap die u zojuist genomen heeft op de weg naar meer kennis over uw eigen lichaam. Hoe meer u van uw eigen lichaam weet, hoe makkelijker het is om invloed uit te oefenen op uw gewicht, uw uiterlijk en uw gezondheid. Omdat uw genen uw stofwisseling en spieropbouw bepalen, stelt uw persoonlijke DNA-Analyse u in staat om uw eetgewoonte en leefwijze te optimaliseren en zo uw doelen makkelijker te bereiken. Wij zijn er van overtuigd dat wij het door u in ons gestelde vertrouwen waar kunnen maken, door middel van de door ons opgestelde en gepersonaliseerde analyses en adviezen.

Wij zijn vereerd dat wij u mogen begeleiden op deze spannende weg waar u, met behulp van onze persoonlijke DNA-Analyse, zult ontdekken hoe uw lichaam functioneert. De sleutel tot succes ligt in onze gepersonaliseerde voedings- en lifestyle-adviezen, waarbij rekening is gehouden uw eigen genetische informatie.

Uw DNA-Analyse is uitgevoerd volgens de hoogste kwaliteitsnormen. Voor onze analyse selecteren wij alleen de genen waarvan de invloed is bewezen op basis van wetenschappelijke literatuur en waarvoor genoeg betrouwbaar bewijs en wetenschappelijk onderzoek is. De analyse wordt uitgevoerd in een gecertificeerd laboratorium waar wordt gewerkt met de hoogste kwaliteitsnormen. Uw DNA wordt geanalyseerd door zeer betrouwbare en de meest geavanceerde technologie. Onze hoogste kwaliteitsnormen garanderen betrouwbare resultaten van de DNA-Analyse.

In aanvulling op deze analyse maken onze voedingsexperts voedings- en lifestyle-adviezen, gespecialiseerd op basis van uw genetische informatie. Of zoals moleculair bioloog Professor Borut Štrukelj zegt:

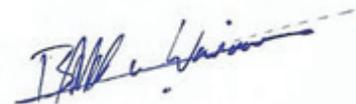
“The personal DNA analysis reveals surprising information which has not been known to us so far. It enables the individual to start eating according to his or her genetic makeup. He or she therefore ingests only what his or her body needs, and, inversely, avoids the nutrients which are, according to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

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

Wij zijn er van overtuigd dat onze persoonlijke DNA-Analyse zal zorgen voor gezonde eetgewoonten, een optimale levensstijl en daardoor een perfecte conditie van uw lichaam en geest. Wij willen u er nadrukkelijk op wijzen dat met onze DNA-Analyse geen fysiek onderzoek heeft plaatsgevonden. Onze analyse geeft u inzage in uw genetische informatie. Wij adviseren u dan ook, bij vragen over de resultaten van onze DNA-Analyse, uw eigen huisarts of specialist te raadplegen. Deze DNA-Analyse is dan ook niet bedoeld om u er toe aan te zetten te stoppen met uw medicijnen of met andere behandelingen die door uw eigen arts zijn voorgeschreven.

U bent zelf de sleutel tot het echte succes van deze DNA-Analyse. Ons advies is dan ook om onze aanbevelingen te volgen maar ze wel op een verantwoordelijke manier uit te voeren. U staat op het punt om zeer verrassende informatie over uw eigen lichaam te ontdekken, wat u in staat zal stellen om uw maximale potentieel te bereiken, zoals Moeder Natuur u dat gegeven heeft.

Bart van Wanrooy, Mijnlabtest.nl



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## THE INFLUENCE OF DIET ON BODY WEIGHT

Analysis	Your result	Summary
Risk for being overweight	 LOWER RISK	Your risk is 39% lower than average, which still doesn't mean that you can't put on weight. We advise you to follow detailed report of the analyses.
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	 NORMAL	You have a normal response to carbohydrates. We recommend to you a balanced intake of 55% daily.
DIET TYPE	<b>BALANCED DIET</b>	Enjoy foods from all food groups, and follow other detailed dietary recommendations.

## FACTORS INFLUENCING METABOLISM

Analysis	Your result	Summary
HDL (good) cholesterol	 AVERAGE LEVEL	Your genes determine an average HDL cholesterol level, meaning that your condition can be improved. Try to be physically active every day.
LDL (bad) cholesterol	 AVERAGE LEVEL	Your genes determine an average level of LDL cholesterol. Great measure is to limit intake of trans fats (margarine, mayonnaise, fried foods, etc.).
Triglycerides	 AVERAGE LEVEL	Your genes determine an average level of triglycerides. Improve the condition further by considering recommendations regarding saturated fats.
Blood sugar	 AVERAGE LEVEL	Limiting intake of foods sweetened with regular white sugar (coffee, donuts, cookies), can have big influence on lowering blood sugar level.

## THE REQUIREMENT OF NUTRIENTS

Analysis	Your result	Summary
Vitamin B6	 <b>HIGH LEVEL</b>	With your daily food, try to take in 1200 mcg of vitamin B6. Sufficient amounts can be found in turkey liver, tuna, unpolished rice or nuts.
Vitamin B9	 <b>LOWER LEVEL</b>	For you the daily vitamin B9 intake is 500 mcg. We recommend to you fruits (apples, dried apricots) and vegetables (leek, broad beans, broccoli).
Vitamin B12	 <b>HIGH LEVEL</b>	Consume 3 mcg of vitamin B12 daily. Include in your menu milk and milk products and occasionally also meat.
Vitamin D	 <b>LOW LEVEL</b>	We recommend to you fish that contain a lot of vitamin D: bass, trout, mullet and tuna in its own juice. Consume 10 mcg of vitamin D daily.
Iron	 <b>LOWER LEVEL</b>	We recommend to you seeds (pumpkin, sesame), pistachios, cashews and rice bran, that will take care of the daily intake of 22 mg of iron.
Sodium (salt)	 <b>LOWER SENSITIVITY</b>	We advice you not to consume more than 2000 mg of sodium daily. Eat less frequently products that are high in salt (smoked meat, ham, sausages).
Potassium	 <b>AVERAGE LEVEL</b>	We advise you to increase your daily potassium intake to 2500 mg. Especially eat nuts (brazil, cashew) and vegetable (dandelion, kale, beans).
Bone density	 <b>LOW DENSITY</b>	Eat foods, that contain a lot of vitamin D, calcium, magnesium, mangan, because your genes determine 9% lower than average bone density.

## EATING HABITS

Analysis	Your result	Summary
Consumption of sweet treats	 <b>HIGHER TENDENCY</b>	Due to higher tendency to have sweet treats, we advise you to avoid stocking up sweets.
Insatiability and hunger	 <b>HIGHER TENDENCY FOR INSATIABILITY</b>	Insatiability can be effectively decreased with the pre-meal glass of water. Water is reducing the space available for food.
Sweet taste perception	 <b>MORE INTENSIVE</b>	Despite the intensive perception of sweet taste, you should decrease the intake. You can lose your sharp perception with excess sweetening.
Bitter taste perception	 <b>MORE INTENSIVE</b>	You perceive bitter taste more intensively. You can alleviate unpleasant taste of broccoli, radish and spinach by preparing them as soups and sauces.

## METABOLIC PROPERTIES

Analysis	Your result	Summary
Alcohol metabolism	 <b>EFFECTIVE METABOLISM</b>	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	 <b>RAPID METABOLISM</b>	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 metabolism	 <b>INEFFECTIVE METABOLISM</b>	In spite of an ineffective metabolism, you are likely to tolerate small amounts of lactose. Keep track of your response to ingested lactose.

## DETOXIFICATION OF YOUR BODY

Analysis	Your result	Summary
Selenium	 <b>HIGHER LEVEL</b>	You daily selenium intake should be 30 mcg. Maintain a healthy weight, because with increasing BMI, daily needs for selenium may increase.
Vitamin E	 <b>AVERAGE LEVEL</b>	Your daily vitamin E intake should be 14 mg. Lot of vitamin E can be found in wheat germ and its oils, almonds, hazelnuts, potatoes and field beans.
Oxidative stress	 <b>HIGHER EXPOSURE</b>	Avoid smoking, as cigarette smoke causes the formation of free radicals, which expose you further to oxidative stress.

## GENETICALLY DETERMINED ADDICTIONS AND AGEING

Analysis	Your result	Summary
Nicotine addiction	 <b>LOWER RISK FOR ADDICTION</b>	Cigarette smoke is a cause of many health problems, so despite what your genetic results we discourage you from smoking.
Alcohol addiction	 <b>LOWER RISK FOR ADDICTION</b>	Drinking a glass of wine with your dinner is recommended, but drinking too much alcohol, despite your good genes, is not healthy.
Biological ageing	 <b>SLOWER AGEING</b>	You age slower compared to others. Be careful with unhealthy bad habits (smoking, alcohol, overeating) so you wouldn't worsen your state.

## SPORTS AND RECREATION

Analysis	Your result	Summary
Muscle structure	 <b>GREAT ENDURANCE</b>	You have durable muscles. We recommend disciplines, such as long distance running, cycling, aerobics, skating, swimming or hiking.
Your aerobic potential	 <b>AVERAGE AEROBIC POTENTIAL</b>	Your aerobic potential is moderate. Perhaps, you need to put some additional effort in achieving the same results as individuals with high aerobic potential.
Soft tissue injury	 <b>HIGHER SOFT TISSUE INJURY RISK</b>	You are more prone to soft tissue injuries, so you should warm up thoroughly before exercise and stop the training gradually.
Post exercise recovery	 <b>FASTER RECOVERY AFTER TRAINING</b>	From genetic point of view you fall within “faster recovery after training”. Sleep amount also affects your recovery, therefore have enough rest, especially after high intensive activity.
Fat burning gene	 <b>FAT BURNING GENE ABSENT</b>	In terms of fat loss with aerobic activities, your genes don't give you an advantage here. If you have problems with fat deposits, you most probably have to work harder.
Warrior gene	 <b>WARRIOR TYPE</b>	Your result gives you an advantage in stressful situation, as you head remains clear and you probably go for more risk-taking decisions in your life.
Muscle volume gene	 <b>AVERAGE MUSCLE VOLUME POTENTIAL</b>	You have one “A” copy of IL15RA gene present. In terms of muscle volume gain potential, you are somewhere in between.
Heart capacity	 <b>AVERAGE HEART CAPACITY POTENTIAL</b>	To increase your heart capacity, try to perform very hard exercise for 3-5 minutes, separated by complete recovery between each hard effort.

## ADJUST YOUR DIET ACCORDING TO YOUR GENES

In this chapter you will learn how your genetic makeup influences the development of overweight, 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.

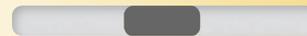
We advise you to follow our recommendations because the balance between the intake and the use of calories, physical activity and genetic background is the key to optimal body weight and well-being. It is generally not recommended to eat more calories than are actually burned. In addition to a controlled 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 than those who had been trying to lose weight in no accordance with their genetics.

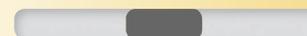
*Risk for being overweight*



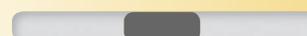
*Response to saturated fats*



*Response to monounsaturated fats*



*Response to polyunsaturated fats*



*Response to carbohydrates*



**DIET TYPE**

**BALANCED DIET**

# Risk for being overweight

Nowadays, excess body weight is a prevailing problem, experienced by many. The biggest culprits for this are our genes, which determine the tendency for storing energy. Numerous genes can be responsible for becoming overweight. In our analysis however, we have included the most reliable genes with the major influence. Undoubtedly, one of the most important genes is MC4R, which is involved in appetite regulation and in maintaining the ratio of ingested and burned calories.

Scientists have discovered a mutation in the DNA sequence close to above mentioned gene, which protects against becoming overweight. It has been scientifically proven that people with a favourable variant of the gene have a smaller likelihood of becoming overweight. In addition to this, we have also analysed other genes that importantly influence the possibility of becoming overweight. With a combination of these genes and based on your DNA, we have calculated the risk which shows how much, compared to the average population, you are prone to becoming overweight. You can find more information on being overweight in the chapter "More on analyses", and the list of all analysed genes can be found in the chapter "Analysed genes".

## Your result: LOWER RISK

Compared to the overall population, slightly more favourable variants of genes are present in your DNA, which determines a lower risk for becoming overweight.

## Recommendations

- Your risk for becoming overweight is lower, which unfortunately does not mean that you cannot gain weight.
- With overeating and no physical activity you can quickly increase your risk. Therefore, despite the favourable genes, we advise you to follow our recommendations.
- Control the amount of consumed animal fats. Choose leaner meat, because the excess fat can quickly start to accumulate in your subcutaneous tissue.
- After a meal, have some fruits; for example, an apple, a few strawberries or cherries, instead of cakes and other sweets. These foods are just as tasty and, at the same time, extremely healthy.
- Instead of soft drinks or other artificial drinks, which contain a lot of calories, we recommend a glass of water.
- We recommend you to take time for a half-hour walk five times a week, as it will increase your metabolism and calorie consumption.

## Your result compared to the average



*“Did you know that we face an epidemic of obesity? In Europe, one third of the population is overweight! Experts predict that being overweight will increase medical costs, as it is associated with many cardiovascular diseases as well as psychological problems.”*

**Gene** - Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents by their descendants, and give information, which is needed for the formation and development of an organism. **DNA** - a molecule, found in the cell nucleus, which carries the instructions for the development of an organism. Human DNA is encoded by three different nucleotides and has the shape of a double coil.

# 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: NORMAL RESPONSE

You are the carrier of the variants of genes FTO and KCTD10, which determine a normal response to carbohydrates.

## Recommendations

- Because of these variants of your genes, we recommend that your diet contains a balanced amount of carbohydrates.
- What exactly this means for you is revealed in the "The type of Diet" analysis, where we have determined, on the basis of your genes, a precise daily intake of carbohydrates suitable for you.
- The fact is that your genes do not determine an increased intake of carbohydrates as being beneficial for you, nor in any way harmful to you to the extent that you would have to reduce their intake – an average, balanced intake of carbohydrates is, therefore, the healthiest for you.
- For following your diet plan, we suggest to use the help of nutrition charts, which will make our recommendations even easier to follow.

*“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.”*

## Useful information

<b>Why we need them</b>	Source of energy, bone- and cartilage-building
<b>Deprivation</b>	Decrease of body and muscle mass, malnourishment, bad mood
<b>Where can they be found</b>	Cereal products (bread, cereals, pasta), vegetables, fruit

**Carbohydrates** - apart from proteins and fats, it is the main macronutrient. It is the basic source of energy. **Types of fats** - in essence, we differentiate animal saturated fats and plant mono- and polyunsaturated fats. **HDL cholesterol** - good cholesterol. A desired level should be as high as possible.

# 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 diet: BALANCED DIET

Your genes determine that the most appropriate diet for you is balanced diet. It will provide you enough energy as well as all required nutrients, which contribute to optimal health. We recommend you to choose diverse food from different food groups. Also follow the detailed recommendations for your diet, which will help you to satisfy your nutritional needs.

### An optimal daily calorie intake

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.

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
1 to 4	1063 *			
5 to 7	1488 *			
8 to 10	1806 *			
11 to 13	2125 *			
14 to 19	2125	2444	2763	3082
20 to 25	2019	2338	2657	2975
26 to 51	2019	2231	2550	2869
52 to 65	1913	2125	2444	2657
over 65	1700	1913	2231	2444

\* Independent of physical activity

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.

## WITH AN APPROPRIATE DIET YOU CAN PREVENT NUMEROUS HEALTH COMPLICATIONS

Cholesterol is a substance which is normally produced by our body, and additionally it is also found in food. We differentiate good HDL cholesterol and bad LDL cholesterol. In addition to cholesterol, our health is also influenced by blood sugar level, which has to be as low as possible, and triglycerides, which, if increased, have the same effect as bad LDL cholesterol. Inappropriate levels of any of these components can quickly cause cardiovascular complications, increased blood pressure, obesity and diabetes. This is, in a way, prevented by complex body mechanisms which are fighting against the external influences (the influence of diet, smoking, alcohol, etc.) and are trying to maintain their optimal level. How good they are at this, mostly depends on our genes. Therefore, people with unfavourable genes have to be so much more careful about their diet and lifestyle.

In this chapter, you will learn what levels of LDL and HDL cholesterol, triglycerides and blood sugar are determined by your genes. In case of unfavourable genes, it is really important to appropriately adjust your diet and achieve a better health.

*HDL (good) cholesterol*



*LDL (bad) cholesterol*



*Triglycerides*



*Blood sugar*



# HDL (good) cholesterol

HDL cholesterol, also known as good cholesterol, is beneficial because it reduces the levels of LDL cholesterol and protects against cardiovascular disease. The HDL particles carry cholesterol from the veins towards the liver, where it is excreted from the body. This is the reason why high levels of HDL cholesterol are an important health factor. While it is true that we risk cardiovascular disease, if our HDL cholesterol level drops below 1mmol/l, the HDL level between 1 and 1,5 mmol/l is determined as average (normal). However, a level, higher than 1,5 mmol/l, already protects us from cardiovascular disease. Therefore, the more HDL cholesterol we have, the better it is for our health. In addition to diet and lifestyle, HDL cholesterol level is influenced also by our genes. We analysed the genes with the greatest impact on HDL cholesterol. In this way we can effectively determine the level of HDL cholesterol that is determined by your genes.

## Your result: AVERAGE LEVEL

Your genes determine an average HDL cholesterol level, since you have about the same number of favourable and unfavourable variants of genes.

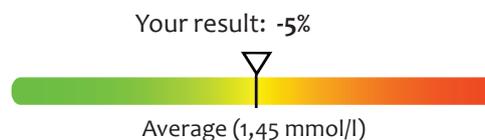
## Recommendations

- You are in between a good and a bad genetic makeup and, by following our recommendations, you can increase your HDL cholesterol level and maintain it above the critical value of 1 mmol/l.
- We recommend a slightly more regular consumption of seafood, especially prawns, squids, shrimps and mussels. They contain a lot of unsaturated fats, which have been proven to increase the HDL cholesterol level. A good alternative to seafood is also onion, which can be added to various foods.
- Your HDL cholesterol level is influenced also by body weight. In case you are too heavy, start fighting against excess weight with physical exercise. If you are not sure which activity to opt for, choose one from the suggested activities in the "Muscle structure" analysis.
- You will also contribute to the increase of the HDL cholesterol level by giving up smoking. If you do not smoke, avoid passive smoking, as it also reduces the HDL cholesterol level.

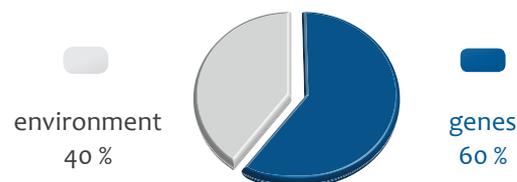
## Useful information

<b>Lay term</b>	Good or beneficial cholesterol
<b>Optimal state</b>	As high as possible (above 1 mmol/l)
<b>Why it decreases</b>	Genetic tendency, consumption of trans fats, not enough exercise, stress, smoking,
<b>Why is it beneficial</b>	Inhibits LDL oxidation and eliminates it from arteries

## Your result compared to the average



## Genes vs. environment



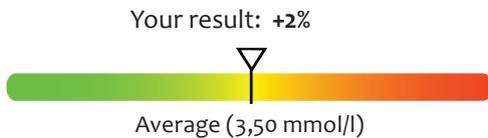
**HDL cholesterol** - good cholesterol. A desired level should be as high as possible. **Gene** - Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents by their descendants, and give information, which is needed for the formation and development of an organism.

# LDL (bad) cholesterol

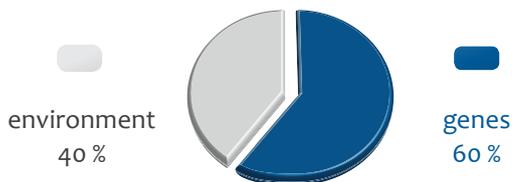
LDL cholesterol, also known as bad cholesterol, is one of the two best-known cholesterol types. It is called the bad cholesterol because of the fact that too much LDL cholesterol is harmful for our health. It slowly accumulates in the inner walls of the arteries, which supply the heart and the brain, and forms thickenings which narrow the arteries and make them less flexible. This phenomenon is called atherosclerosis. When the state does not improve for a longer time, a clot forms and prevents the blood flow in the artery, which can lead to a heart attack or a stroke.

An optimal LDL cholesterol level is below the value 3 mmol/l, which can be measured with a blood analysis. In addition to diet and lifestyle, also your genetic makeup importantly influences the LDL cholesterol level. In our analysis, we have included genes which are the most closely connected to the regulation of LDL cholesterol and have a great influence on it. The combination of all the analysed genes gives reliable information about the level of LDL cholesterol determined by your genes.

## Your result compared to the average



## Genes vs. environment



*“Our level of LDL cholesterol is significantly affected by the hormone melatonin, produced in the skin. It is formed exclusively at night; therefore sufficient sleep can help reduce your LDL cholesterol. Some melatonin is present also in mustard seeds, almonds and sunflower seeds.”*

## Your result: AVERAGE LEVEL

Results of the analysis have shown that you have favourable, as well as unfavourable variants of genes, and this determines an average LDL cholesterol level.

## Recommendations

- Your genes encode an average LDL cholesterol level, which you can additionally reduce with physical activity, and reach an optimal LDL cholesterol level below 3 mmol/l.
- An excellent preventive measure is to limit the intake of foods which contain trans fats (they are formed when processing oils at high temperatures): margarines, fast food, fried food, roasted nuts, mayonnaise, pastry and cakes.
- Pay attention to foods which contains cholesterol. Limit it to 300 mg per day, which is, approximately, an egg and a half. It is wise to remove the yolk (the egg white does not contain cholesterol).
- We recommend that you add more garlic and onions to your food: preparations from garlic and onions have been proven to reduce the LDL cholesterol level.
- Try to eat food rich in fibres, which will favourably influence the LDL cholesterol level. You will find enough fibres in whole wheat pasta and bread, plums and pears.

## Useful information

<b>Lay term</b>	Bad cholesterol
<b>Optimal state</b>	As low as possible (below 3 mmol/l)
<b>Why it increases</b>	Fatty foods, high calorie intake, diabetes, genetic tendency, too little exercise, stress, smoking, alcohol
<b>Why is it harmful</b>	Hardening of the arteries, interrupted blood flow, clogging of the arteries, heart attack, stroke

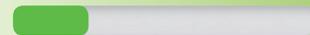
**LDL cholesterol** - harmful for our health and this is why its level should be as low as possible. **Artery** - a blood vessel that carries blood away from the heart. The main artery is the aorta.

## MICRONUTRIENTS PLAY AN IMPORTANT PART IN YOUR HEALTH

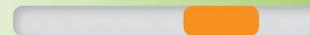
Micronutrients, which include vitamins and minerals, are vital for our health. They are essential for the functioning of our organism; they improve our well-being and prevent many diseases. Their daily requirements are determined by numerous factors, and among them is also our genetic makeup. It determines 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 minerals, such as iron and potassium, are determined by your genes. In addition, you will learn how sensitive you are to kitchen salt or sodium, and what bone density is determined by your genes. The latter can be specifically adjusted with an appropriate intake of vitamins and minerals.

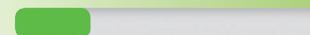
*Vitamin B6*



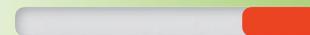
*Vitamin B9*



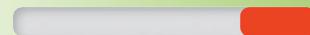
*Vitamin B12*



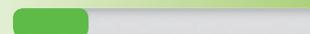
*Vitamin D*



*Iron*



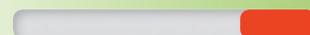
*Sodium (salt)*



*Potassium*



*Bone density*



Chapter contents

# 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 per cent 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.

## Useful information

<b>Why we need it</b>	Red blood cell maturation, the functioning of the nervous system, DNA synthesis
<b>The effects of the lack</b>	Anaemia, psychological disorders, bad eye sight
<b>Where is it found</b>	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 very likely also that vitamin B12 deficiency plays an important role in the development of Alzheimer’s disease, therefore intensive research is on-going in this field.”*



**Mutation** - a random change in the genetic code 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.

# Vitamin D

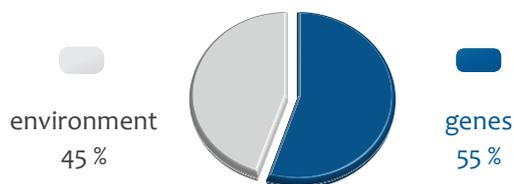
Vitamin D is an important vitamin, which enables the absorption of calcium from the intestines into the blood – vitamin D, allows the calcium to be incorporated into our bones, and is therefore an important factor which enables healthy bones. The level of vitamin D depends on our diet and the exposure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

*“Wondering why the analysis of vitamin D mentions magnesium? Sufficient levels of magnesium in the blood are essential to convert vitamin D into its active form. Magnesium also plays an important role in the influence of vitamin D on the immune system.”*



## Genes vs. environment



## Your result: LOW LEVEL

The genetic analysis reveals that you are the carrier of the least favourable DNA sequence which determines a low vitamin D level.

## Recommendations

- Because of your genes which determine a low vitamin D level, we advise you to follow our recommendations. By taking action, you can appropriately increase your vitamin D level.
- Since your vitamin D requirements are higher, we recommend that you consume 10 mcg of vitamin D daily.
- We recommend eating fish, for example sea bass, mullets, brook trout, and tuna in its own juice, as they are the best source of vitamin D.
- There is also plenty of it in eggs, but in case of increased LDL cholesterol we do not recommend them (you can eat egg white, but vitamin D is only present in the yolk).
- Maintain a healthy body weight. Reducing your weight by 15% will make your vitamin D level become three times higher. You can lose excess weight either with a diet, or with increased physical activity.
- Expose yourself to sunrays many times a week, for a longer period of time (at least 15 minutes), because this encourages the synthesis of vitamin D.

## Useful information

<b>Why we need it</b>	Calcium absorption from intestines into the blood, the formation and regeneration of bones
<b>The effects of the lack</b>	Incorrect growth and healing of bones, rickets, occasional muscle cramps
<b>Where is it found</b>	Milk, beer yeast, fish oil, sardines, salmon, tuna, liver

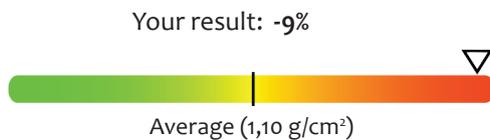
**Absorption** - taking in, ingestion. **Gene** - Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents by their descendants, and give information, which is needed for the formation and development of an organism.

# Bone density

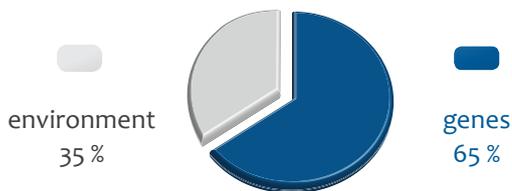
By measuring bone density, we define the vitality of our bones. A decreased bone density is most typical for older people, but also younger people can encounter problems. We know two groups of factors which influence bone health. We have no influence on factors such as age, health condition, medications, health therapies and genetic design, but we can contribute to the health of our bones with regular physical activity and an appropriate diet. An appropriate diet and lifestyle are important already in the early age, because they contribute to maintaining bone density later, at an older age.

To date, many genes that determine bone strength have been discovered, and an understanding of mechanisms with which these genes influence bone structure is improving. You can read more about the genes included in the analysis at the end of your personal DNA analysis in the chapter "Analysed genes".

## Your result compared to the average



## Genes vs. environment



*"The most important method for measuring bone density is bone densitometry, which is performed on the basis of X-rays. Measurements are performed on the lumbar spine and one hip, and in people before the age of 50 also on the wrist. The examination is a safe and simple, and it is conducted in only a few minutes."*

## Your result: LOW BONE DENSITY

Almost all of the analysed genes are present in an unfavourable variant, which determines a genetic tendency for low bone density.

### Recommendations

- Due to unfavourable genes, we advise you a slightly higher calcium intake, namely, 1300 mg per day.
- We recommend eating dried fruit (apricots, figs), which contains the most calcium out of all fruit. Even better sources are poppy seeds, because with 100 g of them you can already exceed your daily requirements.
- On days when you do not manage to fulfil your daily requirements, consider taking calcium food supplements.
- It is important that you make sure your last meal contains high amounts of calcium, because in this way you will inhibit the nocturnal process of bone decomposition.
- There is increasingly more proof that vitamin K plays a significant role in bone formation, and in the incorporation of calcium into the bones. We recommend eating broccoli, cabbage, cauliflower, spinach, green lettuce or fermented soy products, where there is plenty of vitamin K.
- We also recommend manganese (poppy seeds, dandelion) and magnesium (peanuts, almonds, soy), which are also important for bone forming minerals.
- We advise that you follow the recommendations from the "Vitamin D" analysis, because vitamin D is crucial for the absorption of calcium from the intestine into the blood.

### Useful information

#### An unfavourable influence on bones

Smoking, alcohol, excess weight, soft drinks

#### A favourable influence on bones

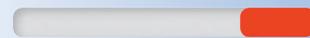
Exercise, a healthy diet, sunbathing, calcium, magnesium, manganese, vitamin K

## ALSO UNHEALTHY EATING HABITS CAN BE INHERITED

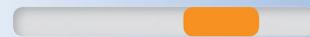
Our health is directly related to our eating habits. Skipping meals, especially breakfast, eating too much candy, eating oversized meals and excessive sweetening of foods are common phenomena in today's society. On one hand, there is a characteristic excessive calorie intake which results in weight-gain, and on the other, there is unhealthy dieting with crash diets which do not have the right effect.

Undoubtedly, our eating habits are also greatly influenced by the environment that we live in. It is full of stress and haste, and such an environment prevents us from developing healthy eating habits. However, eating habits are not merely the consequence of the environment, nor are they completely an individual's free choice. The truth in the matter is that, apart from the environment, it is also our genetic makeup that influences our eating habits.

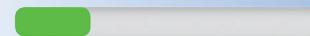
*Consumption of sweet treats*



*Insatiability and hunger*



*Sweet taste perception*



*Bitter taste perception*



# Insatiability and hunger

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.

Hunger is also a complicated mechanism which is set in motion when there is a lack of food in the body. Namely, it is regulated by a part of the brain, called hypothalamus. In addition to body weight, amount of sleep, food and other environmental factors, also the genetic makeup influences the detection of hunger. It has been discovered in a study that people with an unfavourable NMB gene variant are almost two times more prone to feeling hunger than people who do not have this variant of the gene.

*“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. It is possible that you are not hungry, but your body is dehydrated! Many people confuse feeling thirsty for hunger, when in fact they could quench their “hunger” with a glass of water.”*



## Your result: HIGHER TENDENCY FOR INSATIABILITY

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. However, your tendency for feeling hunger is normal, because you have two favourable copies of the NMB gene present.

### Recommendations

- Your genetic makeup determines that you reach the feeling of satiety much 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.
- The main course should include soup, and you will see how this will help you achieve fullness with more ease.
- Instead of eating with big cutlery, eat with smaller. The time of the meal would be the same, but the amount of food would be definitely smaller.

**Hypothalamus** - is cherry-size part in the middle of the brain, and it is the centre off all information concerning endocrine hormones.

# Bitter taste perception

Bitter taste is one of the four basic tastes that we differentiate. Its perception passes through taste receptors which communicate it to the brain that then tells us which taste is in question. However, the bitter taste perception is not equally effective in all people. The described mechanism can have flaws that are expressed in a less intensive perception of bitter taste.

Scientists have discovered that the TAS2R38 gene is responsible for the different susceptibility for bitter taste. Approximately 80 percent of people in the study, who were carriers of two common copies of TAS2R38 gene, did not detect bitter taste. The ability to taste bitter has been determined by the ability to taste a special substance, called 6-N propylthiouracil (PROP). PROP is, normally, not found in nature, but the ability to taste this substance is closely connected to the ability of tasting other related bitter substances, which can be found in broccoli, cabbage, coffee, tonic and some beers. Are you interested to find out what tastes these foods have for you?

## Your result: MORE INTENSIVE

You are the carrier of two rarer copies of the TAS2R38 gene, and you, therefore, perceive bitter taste more intensively.

## Recommendations

- Bitter substances, which you most likely can taste, can be found in kale, radicchio, olives, coffee, tonic and some beers.
- These substances play an important role in digestion, therefore do not leave them out of your meals just because of their bitter taste. However, if you truly find them unpleasant, we recommend the following.
- We recommend the choice of spring vegetables, because of its less bitter taste.
- Sauté the vegetables you find bitter. You will reduce the content of substances which cause bitter taste, as the bitter substances are removed with the drained water.
- You can prepare the mentioned foods in a soup, with pasta or by adding your favourite spices, which will tone down the bitter taste.

*“Favourable or unfavourable feelings to taste have evolutionary significance, since they enabled survival. Substances of very sweet taste evoke pleasurable sensations, as opposed to bitter substances, which discourage people from ingestion. This fact has allowed the separation of high-calorie food sources of potentially toxic substances such as certain alkaloids, which have a bitter taste.”*

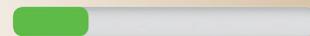


## GENES HELP YOU LEARN ABOUT YOUR BODY'S METABOLISM

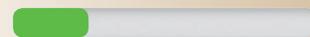
Our body, with the help of specific enzymes, processes or breaks down lactose, caffeine and alcohol after their consumption. This enables them to be used as nutrients, or prevents these substances from becoming harmful. If a certain enzyme does not function optimally, an inappropriate adaptation can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



*Caffeine metabolism*



*Lactose metabolism*



# 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.

Also enzyme ADH1 is important for alcohol metabolism as it is responsible for the first stage of the metabolism of ethanol into acetaldehyde. Researchers have discovered that a mutation can occur also in the genes that encode enzyme ADH1 and this influences greatly the efficiency of ethanol conversion. These mutations are actually not as defining as the one in the ALDH2 gene, but they still greatly determine alcohol sensitivity.

## Your result: EFFECTIVE METABOLISM

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

## 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 as Americans, however, their frequency of cardiovascular diseases is lower. Given that the French consume large amounts of red wine, this is believed to be their secret for success. Scientists have named this phenomenon the French paradox."*



**Mutation** - a random change in the genetic code 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. **Enzyme** - a protein which is involved in chemical processes in the body.

# Lactose metabolism

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: INEFFECTIVE METABOLISM

Your genetic makeup determines that you are lactose intolerant. You have two unfavourable copies of the MCM6 gene present, which determines a much decreased amount or total absence of the lactase enzyme.

## Recommendations

- Despite the unfavourable genetic makeup, it is highly likely that you do tolerate a certain amount of lactose. Most lactose intolerant people can, without trouble, consume 8-10 g of lactose daily, some even 50 g, but highly sensitive people have to limit it to 1 g daily, at most.
- We recommend that you follow your reaction to consumed lactose, and determine how much lactose you tolerate.
- In case of high sensitivity, pay attention to food labels on processed meat, margarines, bread, cereal, instant soups and gravies, cake mixes, biscuits, because lactose can also be present in non-dairy foods.
- Food supplements are also available, which contain the lactase enzyme.
- Also some probiotic yoghurts can alleviate the symptoms. In addition to reduced lactose content, also their bacterial content influences favourably the establishment of balance in the intestinal flora and the alleviation of lactose intolerance.

*“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 in indigenous peoples of northern Europe, where it occurs in around 2 percent of the population.”*

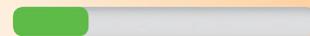


**Lactose** - milk sugar, consisting of glucose and galactose. **Types of fats** - in essence, we differentiate animal saturated fats and plant mono- and polyunsaturated fats.

## GENES CAN ALSO INFLUENCE YOUR PHYSICAL APPEARANCE

In this chapter you will learn about your selenium and vitamin E levels that are determined by your genetic makeup, and how effective the detoxification mechanisms of your body are. Harmful substances enter into our body daily through food, water and air and we desperately need mechanisms that are responsible for detoxification and removal of these substances from our systems. These mechanisms include specific enzymes that detoxify our body, and antioxidants that neutralise free radicals. The formation of free radicals is caused by radiation, cigarette smoke, various pollutants and countless other substances which our body can successfully detoxify with the help of appropriate enzymes. However, a mutation can occur in the genetic makeup of the enzymes, which is then expressed as ineffective detoxification of the above mentioned potentially harmful and toxic substances. In case of an ineffective enzyme function or the lack of a certain enzyme, we are largely exposed to the toxins from the environment, and we have to adapt accordingly.

*Selenium*



*Vitamin E*



*Oxidative stress*



# Selenium

Selenium is one of the very important minerals, because it functions as an antioxidant in your body. It forms an uncommon amino acid, selenocysteine that is needed for the functioning of over twenty enzymes. One of the best known of them is selenoprotein P that has antioxidative properties characteristic also of other selenoproteins. Numerous studies show that a high selenium level in our body has a direct anticarcinogenic and overall protective effect on our health.

It has been discovered in a scientific research that two polymorphisms are present in the gene SEPP-1, which is responsible for selenium transport, and they influence the selenium levels in our body. Scientists have additionally discovered that the selenium level is also determined by our BMI. An unfavourable combination of the genetic makeup and the BMI can influence lower selenium level for up to 24 mcg. In this case, an appropriate dietary adaptation is recommended.

## Your result: HIGHER LEVEL

The genetic analysis has shown that you are the carrier of the variant of the SEPP-1 gene determining a higher selenium level in your body, which is favourable.

## Recommendations

- Despite favourable genetic makeup, be careful because your selenium needs are determined by your BMI.
- Considering the fact that you are the carrier of a favourable genetic makeup, and your BMI is below 30, we recommend you to consume more than 30 mcg of selenium daily.
- In case your BMI increases above 30, we recommend consuming twice as much of selenium per day.
- Selenium is present in many foods, and, therefore, with a diverse choice of foods, you will fulfil your daily requirements.
- We recommend eating diverse foods from the group of cereals, fish and meat, where selenium is most present.
- For a more detailed following of our recommendations we advise a continuous use of nutrition charts.

## Useful information

<b>Why we need it</b>	An important antioxidant, immune system defence, detoxification
<b>Consequences of its lack</b>	Lack of energy, unhealthy skin, weakened immune system
<b>Where is it found</b>	Seafood, liver, cereal sprouts, bran, tuna, onion, broccoli, garlic, brown rice

*“A typical sign of people who consume excessive amounts of selenium is a characteristic smell of garlic, even if the person did not consume any. By taking into account our recommendations this cannot occur, as the person would need to consume 100-times more selenium than the recommended value.”*



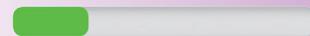
**Antioxidants** - substances which protect us from oxidative stress. **Alkaloid** - a basic unit, from which protein is built. Its formation is encoded in DNA with three sequential nucleotides, which in different combinations give different amino acids: GCU is the code for amino acid alanine, UGU for cysteine... **Anticarcinogenic** - prevents the development of cancer.

## YOU CAN INFLUENCE ADDICTION AND AGEING

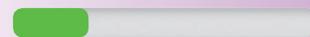
In this chapter you will learn about how susceptible you are to nicotine and alcohol addiction. We will also reveal your rate of aging in comparison to the average population, and whether your genetic makeup determines that a change of lifestyle is important for you.

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. In case we are prone to nicotine or alcohol addiction, it is highly recommended to preventively avoid such habits, as the possibility of addiction is higher. 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.

*Nicotine addiction*



*Alcohol addiction*



*Biological ageing*



# Nicotine addiction

Smoking is proven to be the cause of countless serious medical conditions, which can also be related to a premature death. It is enough to mention that every tenth person (or half of regular smokers in the world) dies because of consequences of smoking. Despite this fact, smoking remains a habit that very few people give up. World Health Organisation estimates, that a year after having their last cigarette, less than 5 percent of people, who have quit smoking without help, remain non-smokers. Smoking causes psychological addiction, and nicotine is the compound responsible for it. It binds with special receptors in the brain, and it causes a feeling of comfort and pleasure. These receptors slightly differ among people, and the mentioned binding is not the same in all people. This is why some people are more addicted to nicotine and some less. Researchers have discovered that a mutation in the gene *CHRNA3* does not influence the beginning of smoking, but it influences the number of smoked cigarettes and causes a greater addiction to nicotine. This is why people with a mutated *CHRNA3* gene find it harder to stop smoking.

## Your result: LOWER RISK FOR ADDICTION

You are the carrier of two favourable copies of the *CHRNA3* gene, which determines a lower risk for nicotine addiction. Approximately 38 percent of people have such a genetic makeup.

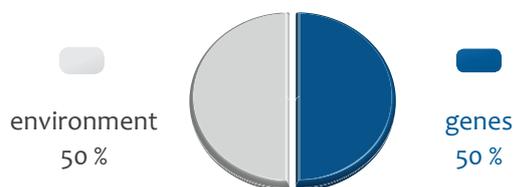
## Recommendations

- If you do not smoke, there is a smaller chance that you become addicted to nicotine, but this is not the reason to experiment with smoking.
- In case you smoke, you can give up smoking much more easily than people with a less favourable genetic makeup. Therefore, do not waste time and start following our recommendations.
- Do not give yourself consolation by telling yourself that one cigarette does no harm. Smoking has, among other things, an unfavourable effect on the HDL cholesterol level and on an increase of the formation of free radicals. When there are too many free radicals in your body, they attack healthy cells and damage them.
- Smoke cigarettes in a way that is unpleasant to you. If you normally drink coffee with smoking, try to leave it out.
- Go out for some fresh air as often as possible, and linger in places where smoking is forbidden.
- Those who have successfully given up this habit should serve you as an example, and give you additional motivation in your own process of giving up smoking.

*“Some smokers continue smoking because they are afraid that they will gain weight if they quit smoking. The weight of smokers on average is as much as 4-5 kg lower than of non-smokers. It is true that the majority gains weight in the first year after they quit smoking, but most often only to the averages of non-smokers.”*



## Genes vs. environment



# 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.

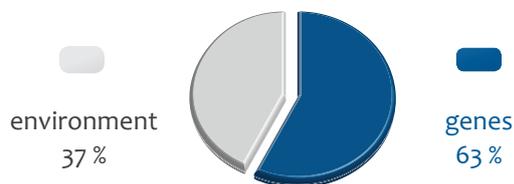
## Recommendations

- 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.
- To summarise: 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.”*



## Genes vs. environment



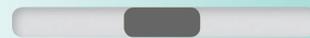
**Chromosome** - a stick-like form of DNA molecule, where there are present hundreds or thousands of genes. In the nucleus, there are 22 autosomal chromosome pairs, and 2 sexual chromosomes. In addition to the molecules of DNA, there are also proteins (mostly histones) present, around which the DNA is coiled. Such coiling and further formation results in a tightly formed chromosome, which takes up less space than an uncoiled molecule.

## 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 learn to what extent you are prone to soft tissue injuries. You will also learn about your aerobic potential and post exercise recovery. 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.

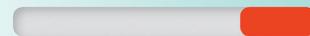
*Muscle structure*



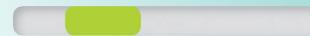
*Your aerobic potential*



*Soft tissue injury*



*Post exercise recovery*



*Fat burning gene*



*Warrior gene*



*Muscle volume gene*



*Heart capacity*



# Your aerobic potential (VO<sub>2</sub>max)

When increasing exercise intensity, our consumption of oxygen increases; but only to a certain point from which the oxygen consumption does not increase any more, even if we further increase the intensity. This is the so called VO<sub>2</sub>max point. VO<sub>2</sub>max therefore greatly influences our capacity to perform endurance exercise. VO<sub>2</sub>max is the label for the maximum oxygen consumption of an individual and indicates the maximal volume of oxygen our body is able to use within one minute. It can be given as absolute value in liters per minute (l/min) or relative value in milliliters of oxygen per kilogram of body weight per minute (ml/(kg x min)).

VO<sub>2</sub>max is partially determined by the ability of the heart to pump blood, and partially, by the ability of the exercising tissues to use oxygen. High VO<sub>2</sub>max values require good interaction between the respiratory, cardiovascular and neuromuscular system. VO<sub>2</sub>max indeed is connected with the results of an athlete, but does not fully explain its success. There are other factors which contribute to the athletes' performance, such as body weight, fat percent, metabolism, and how economical we are in our movement. Therefore, two marathoners could have same VO<sub>2</sub>max but different success at the race.

## Your result: AVERAGE AEROBIC POTENTIAL

Analysis of genes, which influence your aerobic potential, has revealed that you are the carrier of such genetic variants which determine average aerobic capability.

## Recommendations

- Your aerobic potential is average, which means you crawl between favorable and unfavorable genes.
- It is expected that people with low aerobic predisposition will have to work more for the same results compared to you.
- Aerobic potential is under strong genetic influence. This means the influence of genes is pretty strong, while on the other side, environment still is a very important aspect, which means appropriate training is crucial for you, regardless of your average aerobic potential.
- To get an idea of your current aerobic performance, the easiest way is to test for your VO<sub>2</sub>max.
- Follow the instructions on this page and try to perform the very simple Queens College Step test.
- Among activities to increase your VO<sub>2</sub>Max we recommend you to start with basic aerobic training, e.g. continuous, low and moderate intensity (60-80%HRmax), lasting between 20 to 40 minutes repetitive, cyclic movements, such as walking, light jogging, cycling, elliptical device or swimming.
- For better results and in order to decrease mechanical stress and to maintain motivation, use a few types of the mentioned training options.
- Start with 3 training sessions a week and gradually increase training volume to 4-5 times a week, provided you are not involved in other type of physical activity.
- After a few weeks, you may start to play with an intensity parameter, mixing a few minutes of harder work (75-85%HRmax) with a few minutes of active recovery (60-75%HRmax).

*“In general, women reach about 15-30% lower VO<sub>2</sub>max values compared to men. This is mostly due to differences in our body composition, especially a higher percentage of body fats and lower percentage of muscle mass in women. Namely, if someone has more muscles, this also means a higher ability of oxygen consumption.”*



# Soft tissue injury

Soft tissue injury is the injury to the body that does not involve skeletal damage, cardiovascular damage, etc. It is the damage to ligaments, tendons and muscles and can occur when walking, running, or doing some other, more burdensome activity. The role of soft tissues is to connect, support, or surround other structures of our body; therefore they are quite exposed to injury.

Types of soft tissue injuries include acute injury and overuse injury. Acute injuries occur from a known or sometimes unknown incident, where signs and symptoms develop rapidly. While overuse injuries occur as a result of repetitive friction, pulling, twisting, or compression that develops over time. Our genetic makeup can importantly contribute to being more susceptible to the soft tissue injury and if this is the case, appropriate training, especially warming up is even more important. If you know you are prone to injuries, you can modify your training in order to avoid injuries in the future.

## Your result: HIGHER SOFT TISSUE INJURY RISK

Our genetic analysis has shown that you have an overall higher risk for soft tissue injuries.

And you are the carrier of genetic variants, which are related to inflammation. This is an important information, since if you actually suffer from a soft tissue injury, more intensive inflammation processes can importantly affect your recovery in a negative way.

## Recommendations

- Due to your genetic result, we recommend that you increase your warm up duration & intensity, especially in cold environmental conditions.
- Include additional stretching and strengthening exercises in your weekly training programs.
- During warm up, increase speed or jump height gradually.
- Depending on your foot's structure and stability, soft beach sand running may be contra-indicated for you.
- Also, a grass trail will usually be more suitable than a sidewalk.
- Wear appropriate footwear that fits well and provides adequate support and traction for the playing surface. Apply to a sport biomechanics professionals, rather than a "brand" shoe distributors to fit yourself a most matching pair of shoes
- The shoes must feel comfortable; rotating between a few pairs of shoes is beneficial for better load distribution over time; a slightly used shoe is better than a brand new one
- We recommend that you avoid uphill training, excessive plyometric training or excessive speed training.
- After intensive training don't forget to massage your leg muscles (especially calf muscles) and Achilles tendon.
- The day after a game or high intensity training or training on a hard surface, reduce load on tendons. You can go for swimming or biking.
- Encourage medical staff to check tendons for any unusual findings, soreness, swelling, cracking or pain.
- If you feel pain, utilize ice pads for about 10-20 min.
- Maintain normal body weight or BMI < 25, since higher BMI poses higher risk for injury.
- Drink water before, during and after physical activity.

*"Many professional athletes are subject to Achilles tendon injury. Problems occur with excessive and repetitive load which surpasses the tendon's ability of regeneration, and this leads to a state, called Achilles tendinopathy. The cause for Achilles tendinopathy is, in addition to wrong training, also our genetic makeup, which determines the flexibility of the tendon. If our Achilles tendon is not flexible as much as it should be, we are more prone to injury."*



# Post exercise recovery

Did you know that physical activity can cause oxidative stress in our body via increased production of Reactive oxygen species (ROS)? Exercise can, besides the production of ROS, affect the body's complex immune system and produces a cascading effect of inflammatory responses, leading to chronic inflammation.

Reactive oxygen species are constantly generated in our body during various processes of cell metabolism. ROS by itself are not bad, while increased production of ROS can lead to oxidative damages, which also affect the immune system to be activated. This can be the situation during and after physical activity. Namely, during high-intensity training, the uptake of oxygen into active muscles is increased up to 20-fold, while the flow of oxygen in activated muscles can be increased even up to 100-fold. Consequently, large amounts of ROS are formed. Likewise, production of ROS is increased in case of skeletal muscle injuries. If ROS are formed in amounts that exceed the capacity of our antioxidant defense system, this causes oxidative stress in our body. And when a body becomes chronically inflamed, a host of negative and potentially injurious conditions can result.



## Your result: FASTER RECOVERY AFTER TRAINING

The analysis of group of genes, involved in removal of Reactive-Oxygen-Species and inflammatory processes, has shown that out of 8 genes analyzed, favorable genetic variants are prevailed, which means from genetic point of view you fall within “faster recovery after training”.

## Recommendations

- Fast recovery after training is good, as this means that your genes determine your body needs less time to recover.
- However, if you feel you need more time to recover, high-intensive training two days in a row is counterproductive for you. Measure your resting heart rate next morning and if it's higher than usual, you need another day to recover.
- You can also consider using zinc supplements. Zinc eradicates inflammation and can help to improve your muscle mass.
- The amount of sleep also affects your recovery; therefore have enough rest, especially after high intensive activity.
- Eliminate trans-fats for lower inflammation.
- Nevertheless, it is highly recommended to monitor your general condition for any signs of chronic overtraining.
- No matter if you are a professional or recreational athlete, training diary management is a perfect tool for finding an optimal recovery time from a given type of activity.

*“Stress causes a temporary decrease in body function, followed by an adaptation that improves function. In order for us to improve our health, fitness or athletic ability, it is necessary to increase our efforts to fatigue-level intensities and then recover and refuel.”*

# Fat burning gene

The main three energy sources to draw upon when exercising are phosphocreatine (for short, intense bursts of activity), carbohydrates, and fat. The ability to utilize stored or consumed fats into fuel over carbohydrates combined with the fast and slow-twitch muscle fibres dominance are both important factors affecting endurance performance and also how much we actually benefit from endurance exercise in terms of losing fat deposits.

Endurance exercises consist of long-term, moderate muscle resistance activities, where muscles contract mostly in cyclic pattern. It is known that it is possible to reduce our fat deposits with the help of physical activity based on endurance, and, at the same time, positively affect our health. However, such activities do not have the same results on all individuals. It has been proven that the answers lay mostly in our genetic makeup. In the scientific study we are referring to, it has been studied how effectively individuals with different genetic makeup burn their fat deposits. Experts prepared a 20-week progressive endurance training program. The results acquired after the finished program were surprising, because individuals with a rare variant of the LPL gene had lost 2-times more fat deposits than those who did not have this favourable variant of the gene.

## Your result: FAT BURNING GENE ABSENT

The analysis has shown that you are the carrier of two common LPL gene copies, and thus, from the perspective of fat loss, your benefit from cardio activities is just as usual (no extra benefit).

### Recommendations

- With endurance exercises you lose body fat as the majority population, nevertheless this is less effective, compared to people with one or two rare copies of LPL gene. You will, therefore, have to run or cycle more intensively in order to equally effectively lose fats.
- It also means, that if your main goal is body fat percentage decrease, you should put more emphasis on your nutrition and lower your expectations concerning exercise induced fat loss.
- Despite the usual benefit of endurance exercises, running and cycling are definitely recommended for you, because it is precisely regular physical activity that is the key to health and well-being.
- In addition, we advise you to practice activities which are in accordance with your muscle structure. Therefore, follow the recommendation of the "Muscle structure" analysis.
- After finishing training, allow your body to rest and regenerate.

*"To lose 1 kg of body weight only by physical activity, you would have to burn up to 7,000 calories. In 1 hour of cycling you spend 600-900 calories, which means that in order to reduce your body weight by 1 kg would require 8-12 hours of cycling. Some persistence is definitely necessary, right?"*



# Warrior gene

Even with years of preparation and training, some people crack under pressure, while others seem to thrive on pressure and adrenalin. The answer particularly lies in the COMT gene. Its product is responsible for breaking down the adrenaline. Due to the variant within this gene, some people are “warriors” while others are “worriers” in their nature. The “GG” carriers (Warriors) have a highly active COMT enzyme; therefore, adrenaline is broken down fast, resulting in a low baseline level of adrenalin. While the “AA” carriers (Worriers) create the COMT enzyme with the lowest activity, which results in a high baseline level of adrenalin. The “AG” form comes somewhere in the middle.

For everybody there is an optimal level of adrenalin. The worrier is probably already at his/her optimal level therefore the automatic increase in adrenalin in a challenging situation will push him/ her over the edge. Their hands get sweaty, their muscles start shaking, motor skills start to suffer, their brain is working too hard with incoherent thinking as a result and they suffer from tunnel vision. Looking at the warrior, whose adrenalin levels are normally low, the same challenging situation will cause an increase in adrenalin up to the optimal level.

*“COMT is decreased by estrogen, such that overall COMT activity in prefrontal cortex and other tissues is about 30% lower in females than in males. This diminished COMT activity translates to about 30% higher baseline adrenalin levels in females than males.”*



## Your result: WARRIOR TYPE

The analysis of specific variant within COMT gene has revealed that you are the carrier of the “GG” genotype, which means you fall within Warrior type of people.

### Recommendations

- In normal daily situations, your level of adrenalin is lower, compared to the “AA” carriers, while in challenging situations your level of adrenalin is just at the right level to be effective.
- This gives you an advantage in stressful situation, as your head remains clear and you probably go for more risk-taking decisions in your life.
- On the other side, the “AA” carriers statistically perform worse under stress because they have too much adrenalin.
- Most probably, your pain threshold is higher and you have an advantage in attention tasks.
- It should be somehow easier for you to be successful in achieving your fitness goals, as you don't find the process towards your goals too stressful.

# 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).

## 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.

*“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.”*

## GENETICS AND NUTRITION GLOSSARY

**Absorption:** taking in, ingestion

**Allele:** one of the forms of genetic material on a specific part 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 basic 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.

**Cell respiration:** a basic process where energy, carbon dioxide and water are formed from glucose and oxygen.

**Tannin:** is a bitter plant polyphenolic compound

**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 encoded by three different nucleotides and has the shape of a double 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.

**Phenotypical characteristic:** a visible characteristic of an individual, such as, for example, eye colour.

**Gene:** Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents by their descendants, and give information, which is needed for the formation and development of an organism.

**Genetic analysis:** revision, or the analysis of your genes.

**Genome:** the entire DNA which is present in the cell nucleus, and includes all the autosomal chromosomes, and both sexual chromosomes.

**Genotype:** allele forms 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.

**Genetic code:** is a general term, which is usually a synonym for genotype, or form 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.

**Glycemic index:** it shows the increase of blood sugar level, caused by certain food (it does not consider the amount of food).

**Glycemic load:** it shows the increase of blood sugar level, caused by certain food. (it considers the amount of food).

**Glycogen:** the basic form of glucose storage in our body.

**Glucose:** the basic representative of carbohydrates. We also call it blood sugar.

**HDL cholesterol:** good cholesterol. A desired level should be as high as possible.

**Hydrogenised fats:** are trans fats, which are formed with heating of plant oils on high temperatures.

**Cholymicron:** it helps cholesterol in passing through the intestinal mucus, and it contains a minimal amount of cholesterol and triglycerides.

**Hypothalamus:** is cherry-size part in the middle of the brain, and it is the centre off all information concerning endocrine hormones.

Food (100 g)	Food (general portion)	Calories	Proteins	Carbo- hydrates	Saturated fats	Monoun- saturated fats	Polyun- saturated fats	Choles- terol	B6
<b>CEREALS AND STARCHY FOODS</b>									
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	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	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	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

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magne- sium	Mangan	Sodium
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
22 mcg	0 mg	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
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
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
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
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
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
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
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
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
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
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
12 mcg	0,0 mcg	0,0 mcg	0 mg	~	2,0 mg	220 mg	~	10 mg	56 mg	1,2 mg	6 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
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
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
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
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
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
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
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
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
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
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
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
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
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

**RISK FOR BEING OVERWEIGHT**

Herbert et al. (2006) . A common genetic variant is associated with adult and childhood obesity. *Science* 312(5771): 279-283

Sookoian et al. (2005) . Meta-analysis on the G-308A tumor necrosis factor alpha gene variant and phenotypes associated with the metabolic syndrome. *Obes Res* 13(12): 2122-2131

Benzinou et al. (2008) . Common nonsynonymous variants in PCSK1 confer risk of obesity. *Nat Genet* 40(8): 943-945

Heard-Costa et al. (2009) . NRXN3 is a novel locus for waist circumference: a genome-wide association study from the CHARGE Consortium. *PLoS Genet* 5(6): e1000539

Willer et al. (2009) . Six new loci associated with body mass index highlight a neuronal influence on body weight regulation. *Nat Genet* 41(1): 25-34

Thorleifsson et al. (2009) . Genome-wide association yields new sequence variants at seven loci that associate with measures of obesity. *Nat Genet* 41(1): 18-24

**RESPONSE TO SATURATED FATS**

Corella et al. (2009) . APOA2, dietary fat, and body mass index: replication of a gene-diet interaction in 3 independent populations. *Arch Intern Med* 169(20): 1897-1906

**RESPONSE TO MONOUNSATURATED FATS**

Warodomwichit et al. (2009) . ADIPOQ polymorphisms, monounsaturated fatty acids, and obesity risk: the GOLDN study. *Obesity* 17(3): 510-517

**RESPONSE TO POLYUNSATURATED FATS**

Tai et al. (2005) . Polyunsaturated fatty acids interact with the PPARA-L162V polymorphism to affect plasma triglyceride and apolipoprotein C-III concentrations in the Framingham Heart Study. *J Nutr* 135(3): 397-403

Junyent et al. (2009) . Novel variants at KCTD10, MVK, and MMAB genes interact with dietary carbohydrates to modulate HDL-cholesterol concentrations in the Genetics of Lipid Lowering Drugs and Diet Network Study. *Am J Clin Nutr*, 90(3): 686-694

**RESPONSE TO CARBOHYDRATES**

Sonestedt et al. (2009) . Fat and carbohydrate intake modify the association between genetic variation in the FTO genotype and obesity. *Am J Clin Nutr* 90(5): 1418-1425

**HDL (GOOD) CHOLESTEROL, LDL (BAD) CHOLESTEROL AND TRIGLYCERIDES**

Kathiresan et al. (2008) . Six new loci associated with blood low-density lipoprotein cholesterol, high-density lipoprotein cholesterol or triglycerides in humans. *Nat Genet* 40(2): 189-197

Teslovich et al. (2010) . Biological, clinical and population relevance of 95 loci for blood lipids. *Nature* 466(7307): 707-713

**BLOOD SUGAR**

Dupuis et al. (2010) . New genetic loci implicated in fasting glucose homeostasis and their impact on type 2 diabetes risk. *Nat Genet* 42(2): 105-116

**VITAMINS**

Yazdanpanah et al. (2008) . Low dietary riboflavin but not folate predicts increased fracture risk in postmenopausal women homozygous for the MTHFR 677 T allele. *J Bone Miner Res* 23(1):86-94

