

NUTRIFIT

Premium

Nutrigenetic analysis

TEST SUBJECT

ID: 00002





Dear Mr Subject,

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

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

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

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

"The personal DNA analysis reveals surprising information which has not been known to us so far. It enables the individual to start eating and training according to his/her genetic makeup. He/she, therefore, ingest only what his/her body needs, and go for training regime, which, according to his/her genetic makeup, suits him/her the most."

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

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

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



ANALYSIS OVERVIEW OF YOUR RESULTS	8
INSTRUCTIONS FOR READING YOUR PERSONAL DNA ANALYSIS	14
ABC OF GENETICS	16
ABC OF DIET	18
THE INFLUENCE OF DIET ON BODY WEIGHT	20
WEIGHT LOSS-REGAIN.....	22
RISK OF BEING OVERWEIGHTED.....	23
RESPONSE TO SATURATED FATS.....	24
RESPONSE TO MONOUNSATURATED FATS.....	25
RESPONSE TO POLYUNSATURATED FATS.....	26
RESPONSE TO CARBOHYDRATES.....	27
DIET TYPE.....	28
THE REQUIREMENT OF NUTRIENTS	30
VITAMIN B6.....	32
VITAMIN B9.....	33
VITAMIN B12.....	34
VITAMIN D.....	35
IRON.....	36
SODIUM (SALT).....	37
POTASSIUM.....	38
BONE DENSITY.....	39
ZINC.....	40

EATING HABITS	42
SWEET TREATS INTAKE.....	44
SATIETY AND HUNGER	45
PERCEPTION OF SWEET TASTE.....	46
PERCEPTION OF BITTER TASTE.....	47
METABOLIC PROPERTIES	48
ALCOHOL METABOLISM.....	50
CAFFEINE METABOLISM.....	51
LACTOSE INTOLERANCE.....	52
GLUTEN INTOLERANCE.....	53
DETOXIFICATION OF YOUR BODY	54
OXIDATIVE STRESS.....	56
VITAMIN E	57
SELENIUM.....	58
VITAMIN C.....	59
SPORTS AND RECREATION	60
MUSCLE STRUCTURE.....	62
STRENGTH TRAINING.....	64
SOFT TISSUE INJURY RISK.....	65
VO2MAX (YOUR AEROBIC POTENTIAL)	66
POST-EXERCISE RECOVERY	68
WARRIOR GENE.....	69
HEART CAPACITY.....	70

MUSCLE VOLUME GENE	72
LEAN BODY MASS	74
GENE FOR MUSCLE FATIGUE	75

LIFESTYLE	76
NICOTINE ADDICTION	78
ALCOHOL ADDICTION	79
BIOLOGICAL AGEING	80
INFLAMMATION SENSITIVITY	81
SLEEP CYCLE	82

CARDIOVASCULAR HEALTH	84
HDL (GOOD) HOLESTEROL	86
LDL (BAD) CHOLESTEROL	87
TRIGLYCERIDES	88
BLOOD SUGAR	89
OMEGA-3 METABOLISM	90
OMEGA-3 AND TRIGLYCERIDES	91
INSULIN SENSITIVITY	92
ADIPONECTIN	93
C-REACTIVE PROTEIN (CRP)	94

SKIN REJUVENATION	96
SKIN ANTIOXIDANT CAPACITY	98
GLYCATION PROTECTION	99
CELLULITE	100

CONTENTS

SKIN HYDRATION.....	101
SKIN ELASTICITY.....	102
STRETCH MARKS	103
MORE ON ANALYSES	104
ANALYSED GENES	110
GLOSSARY	120
NUTRITION CHARTS	126
SCIENTIFIC SOURCES	138

THE INFLUENCE OF DIET ON BODY WEIGHT

Analysis	Your result	Summary
Weight loss-regain	MORE LIKELY TO REGAIN WEIGHT	<i>If you would like to lose some weight, it is not recommended to starve yourself! Rather develop healthy eating habits which you will be able to follow even after you reach your desired weight.</i>
Risk for being overweighted	LOWER RISK	<i>Your risk is 32% 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.</i>
Response to saturated fats	NORMAL	<i>The intake of saturated fats is not additionally unfavourable for you. Despite that, your daily intake should not exceed 10% of caloric intake.</i>
Response to monounsaturated fats	NORMAL	<i>Your daily intake of monounsaturated fats should be 10% of caloric intake. We recommend you to prefer olive oil when preparing the food.</i>
Response to polyunsaturated fats	NORMAL	<i>Polyunsaturated fats should represent 7% of your daily caloric intake. You will find sufficient amounts of them in hazelnuts, almonds, mackerels, etc.</i>
Response to carbohydrates	UNFAVOURABLE	<i>Due to your unfavourable response to carbohydrates, we recommend you to lower their daily intake. Restrict it to 50% of daily caloric intake.</i>

LOW CARB DIET

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

THE REQUIREMENT OF NUTRIENTS

Analysis	Your result	Summary
Vitamin B6	LOW LEVEL	<i>Eat foods that contain more vitamin B6 (figs, apricots, chicken), to make sure that your daily consumption of vitamin B6 would be 2300 mcg.</i>
Vitamin B9	LOWER LEVEL	<i>For you the daily vitamin B9 intake is 500 mcg. We recommend to you fruits (oranges, dried apricots) and vegetables (leek, broad beans, broccoli).</i>
Vitamin B12	HIGH LEVEL	<i>Consume 3 mcg of vitamin B12 daily. Include in your menu milk and milk products and occasionally also meat.</i>

THE REQUIREMENT OF NUTRIENTS

Analysis	Your result	Summary
Vitamin D	 AVERAGE LEVEL	For consuming 25 mcg of vitamin D daily, we advise you to consume fish (sardines, mackerel) and dairy products.
Iron	 LOWER LEVEL	We recommend to you seeds (pumpkin, sesame), pistachios, cashews and rice bran, that will take care of the daily intake of 15 mg of iron.
Sodium (salt)	 AVERAGE SENSITIVITY	Eat food, that is poor in sodium – consume less than 1200 mg of sodium daily. To improve the taste of food, use lemon, garlic or mint.
Potassium	 LOWER LEVEL	We recommend 4000 mg of potassium daily. Fruits (apricots, blueberries), vegetables (leeks, wheat germ), and pistachios are the best sources.
Bone Density	 AVERAGE DENSITY	You can improve your state with regular physical activity and with foods that contain more vitamin C (broccoli, cabbage, black currants).
Zinc	 AVERAGE LEVEL	We advise you to consume not less than 13 mg of zinc daily. Some vegetables are high in zinc, however, phytates in vegetables can have an inhibitory effect. That can be minimised by soaking.

EATING HABITS

Analysis	Your result	Summary
Sweet treats intake	 LOWER TENDENCY	If you, despite favourable genes, will get an urge to have something sweet, instead of unhealthy snacks, pick rice waffles coated with yogurt.
Satiety and hunger	 HIGHER TENDENCY FOR INSATIABILITY	Insatiability can be effectively decreased with the pre-meal glass of water. Water is reducing the space available for food.
Perception of sweet taste	 LESS INTENSIVE	We advise you to give up sweetening out of habit. Your taste receptors will get adapted and will slightly sharpen the perception.
Perception of bitter taste	 MORE INTENSIVE	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	LESS EFFECTIVE METABOLISM	Stay moderate with your alcohol consumption. We advise you to dilute alcoholic drinks with water, sparkling water or juice.
Caffeine metabolism	RAPID METABOLISM	You are fast caffeine metabolizer, therefore it has little bit less impact on you. Despite that, we do not advise you to drink more than 2 cups of coffee per day.
Lactose intolerance	EFFECTIVE METABOLISM	You have an effective lactose metabolism. Consumption of milk and milk products is recommended to you in terms of metabolism of lactose.
Gluten intolerance	LOW LIKELIHOOD	Gluten most likely does not impact your metabolism. Your diet should remain as diverse as possible. If experiencing any problems associated with gluten intolerance, try a gluten-free diet.

DETOXIFICATION OF YOUR BODY

Analysis	Your result	Summary
Oxidative Stress	LOWER EXPOSURE	Despite your favourable genes, we discourage you from smoking or drinking, as these activities will expose you to free radicals and oxidative stress.
Vitamin E	AVERAGE LEVEL	Your daily vitamin E intake should be 14 mg. Lot of vitamin E can be found in wheat germ and its oils, almonds, hazelnuts, tomatoes and broad beans.
Selenium	HIGHER LEVEL	You daily selenium intake should be 40 mcg. Maintain a healthy weight, because with increasing BMI, daily needs for selenium may increase.
Vitamin C	HIGH LEVEL	Your daily vitamin C intake should be around 100 mg. We advise you to include turnips, cabbage, peas, and potatoes in your diet.

SPORTS AND RECREATION

Analysis	Your result	Summary
Muscle structure	GREATER ENDURANCE	You have durable muscles. We recommend disciplines, such as long distance running, cycling, aerobics, skating, swimming or hiking.
Strength training	LESS RECOMMENDED	To built up some muscles without accumulating extra fat we don't recommend heavy weight lifting. Go for workouts, focused on your own weight: e.g. push-ups, sit ups, lifting yourself on a bar.
Soft tissue injury risk	HIGHER SOFT TISSUE INJURY RISK	You are more prone to soft tissue injuries, so you should warm up thoroughly before exercise and stop the training gradually.
VO2max	HIGHER AEROBIC POTENTIAL	Due to your favorable result it's expected that compared to people with low aerobic predisposition you have to work less for the same results.
Post exercise recovery	FAST RECOVERY AFTER TRAINING	You are not a carrier of genetic variants which could affect your ability to recover after training.
Heart capacity	AVERAGE HEART CAPACITY POTENTIAL	To increase your heart capacity, try to perform very hard exercise for 3-5 minutes, separated by complete recovery between each hard effort.
Muscle volume gene	LOW MUSCLE VOLUME POTENTIAL	Your genetic makeup doesn't give you an advantage in terms of muscle volume gain potential compared to the individuals with one or two A copies of IL15RA present.
Warrior gene	IN BETWEEN WARRIOR AND WORRIER	The analysis of specific variant within COMT gene has revealed that you are carrier of the "AG" genotype, which means you fall somewhere in between warrior and worrier type.
Lean body mass	HIGHER POTENTIAL	For high lean body mass, make sure to consume enough proteins and stay hydrated. Good sources of proteins include eggs, low-fat dairy, lean steak, white-meat poultry and fish.
Gene for fatigue	FASTER LACTATE REMOVAL	Even if your genetic predispositions are associated with a lower degree of fatigue, performing an active cool-down after workout will help clear lactate more quickly than simply resting.

LIFESTYLE

Analysis	Your result	Summary
Nicotine addiction	 LOWER RISK FOR ADDICTION	<i>Cigarette smoke is a cause of many health problems, so despite what your genetic results we discourage you from smoking.</i>
Alcohol addiction	 AVERAGE RISK FOR ADDICTION	<i>You have higher risk for alcohol addiction, compared to people with most favourable genetic makeup, so you should limit your alcohol consumption.</i>
Biological ageing	 SLOWER AGEING	<i>You age slower compared to others. Be careful with unhealthy bad habits (smoking, alcohol, overeating) so you wouldn't worsen your state.</i>
Inflammation sensitivity	 LOWER SENSITIVITY	<i>To ensure a lower level of inflammation, include antioxidants and other anti-inflammatory foods in your diet. For example, dark green vegetables, dark chocolate, garlic, walnuts, ginger or salmon.</i>
Sleep cycle	 INTERMEDIATE TYPE	<i>Intermediate-type people reach peak performance 6.3 hours after waking. At this time, you should perform the most difficult mental or physical activities.</i>

CARDIOVASCULAR HEALTH

Analysis	Your result	Summary
HDL (good cholesterol)	 AVERAGE LEVEL	<i>Your genes determine an average HDL cholesterol level, meaning that your condition can be improved. Try to be physically active every day.</i>
LDL (bad cholesterol)	 AVERAGE LEVEL	<i>Your genes determine an average level of LDL cholesterol. Great measure is to limit intake of trans fats (margarine, mayonnaise, fried foods, etc.).</i>
Triglycerides	 HIGH LEVEL	<i>Your genes determine 27% higher than average level of triglycerides. You are advised to follow the detailed recommendations, located in the analysis.</i>
Blood sugar	 AVERAGE LEVEL	<i>Limiting intake of foods sweetened with added sugar (coffee, donuts, cookies), can have big influence on lowering blood sugar level.</i>
Omega-3 metabolism	 SLIGHTLY INCREASED RISK OF DEFICIENCY	<i>We recommend that you include salmon, tuna or sardines, which are high in EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) types of omega-3 fatty acids.</i>

CARDIOVASCULAR HEALTH

Analysis	Your result	Summary
Omega-3 and triglycerides	● MORE EFFICIENT	Your genes determine that a diet rich in omega-3 fatty acids may be a very efficient strategy in lowering your triglycerides. In case of high triglycerides, think about including more omega-3 in your diet.
Insulin sensitivity	● AVERAGE SENSITIVITY	Include foods rich in fibre - especially those with soluble fibre, such as legumes, oatmeal, flaxseeds, brussels sprouts and oranges.
Adiponectin	● AVERAGE LEVEL	Your genes determine average production of adiponectin. Adiponectin level also depends on body weight, therefore keeping BMI under 25 units should be one of the most important long-term goals.
C-reactive protein CRP	● AVERAGE CRP LEVEL	To keep your CRP level low we recommend you to opt for low glycaemic index food. This helps to reduce blood insulin and sugar which may provoke inflammations and is beneficial for overall health.

SKIN REJUVENATION

Analysis	Your result	Summary
Skin antioxidant capacity	● SLIGHTLY LESS EFFICIENT	Vitamins C and E, CoQ10, resveratrol, green tea, coffee berry polyphenols have all shown efficiency as antioxidants and free radical scavengers for skin protection.
Glycation protection	● LESS EFFICIENT	Try to limit your intake of food products that are high in white sugar and fructose corn syrup. These are popular ingredients in soda, fruit-flavoured drinks, packaged bread and crackers.
Cellulite	● INCREASED RISK	Regular physical activity, low sugar intake, sufficient water drinking are all good measures which can help to prevent the development of cellulite and reduce its appearance.
Skin hydration	● DECREASED	Use moisturizers and night creams regularly. They should include ingredients in one of three different classes to help promote skin hydration: humectant, emollients and occlusive.
Skin elasticity	● HIGHER RISK	Avoid tannings boots as they damage the skin with intense UVA light. Also include foods rich in vitamin A like sweet potatoes, carrots, spinach and beef livers.
Stretch marks	● INCREASED RISK	The most you can do to prevent stretch marks is to maintain a healthy weight. Rapid weight gain is one of the major causes of the formation of stretch marks.

INSTRUCTIONS FOR READING YOUR PERSONAL DNA ANALYSIS

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

Index and an overview of analyses with your advice

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

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

Sections and analyses

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

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

1. SECTION THE INFLUENCE OF DIET ON BODY WEIGHT

2. SECTION THE REQUIREMENT OF NUTRIENTS

3. SECTION EATING HABITS

4. SECTION METABOLIC PROPERTIES

5. SECTION DETOXIFICATION OF YOUR BODY

6. SECTION SPORTS & RECREATION

7. SECTION LIFESTYLE

8. SECTION CARDIOVASCULAR HEALTH

9. SECTION SKIN REJUVENATION

Results of your personal DNA analysis

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



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

The analysed genes



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

Recommendations of your personal DNA analysis

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

Nutrition charts

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

Legal liability

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



Genes and genetic mutations

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



When doing a personal DNA analysis we analyse more than 100 sites (loci) of your DNA where such mutations can occur. The type of mutation at this locus of DNA is called the genotype. If there is a possibility of substitution at a specific locus of DNA from C to T we have 3 possible genotypes: CC, CT or TT. This happens, because we inherit the DNA from our mother, as well as our father, and we, therefore, have every gene present in two copies. It is, therefore, possible for a mutation to occur only in one copy of the gene, in both copies, or not to occur at all.

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

Heritability

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

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



Nutrigenetics – the needs of our body are unique

Nutrigenetics and sports genetics focus on consequences of those genetic mutations that affect our nutritional needs and our sports characteristics. The objective of nutrigenetics and sports genetics is to recognise **specific characteristics of an individual based on which the diet and training can be optimised**. Nutrigenetics/sports genetics, of course, is not part of the alternative medicine, and it is not a form of treatment. It is not an approach which would include modifying the DNA, and it does not determine an optimal diet/training based on blood type or any other phenotypical characteristics of a person.

A personalised nutrition – the basis for optimal diet

Although 99 percent of our genetic makeup is completely identical, there are approximately **ten million genetic variations** among individuals. In accordance to this, the nutritional needs of every individual are very specific. We also know, that due to genetics, the same kind of training doesn't work for everyone. A personalised approach is essential and absolutely necessary for an optimal diet and training results, in the same way as your personal doctor, who knows you, is necessary for ensuring your health. Diet and physical activity are also one of the factors that we can use to influence our body and at the same time a factor that can most easily be influenced.

An optimal diet – the key to health and happiness

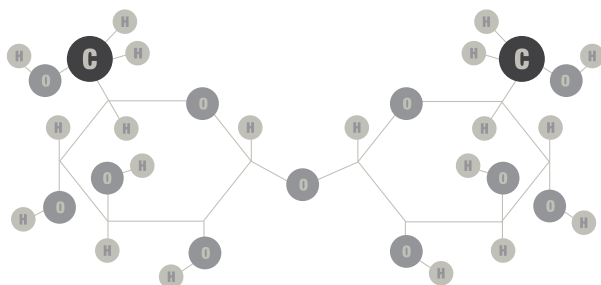
An optimal diet is an adjusted way of eating which can help us reach an **optimal functioning of our body**, as well as a long and healthy life. When our diet is optimal, we are emotionally more stable, physically active and we have significantly fewer health problems.

By following our recommendations and with a consistent use of "Nutrition charts", you now have a unique opportunity to step on a path of an optimal diet. You will see food items in the charts are organised according to their importance. They, therefore, represent a great resource that enables you to choose a food combination which ensures your body a sufficient amount of nutrients. We recommend that you try to place different food items from different food groups on your menu.



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

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



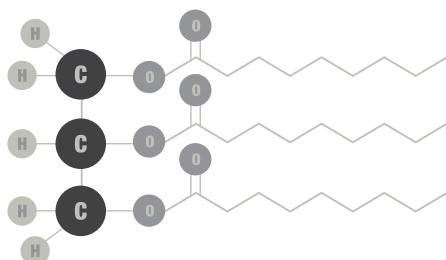
A system called glycemic index has been established for evaluating a food item on the basis of its influence on the increase of blood sugar level. This system arranges foods into classes with values from 0 to 100, according to how quickly they increase blood sugar level in comparison to pure glucose.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

Fats represent the next group of nutrients, which are known for their high energy content. They are predominantly important for digesting fat-soluble vitamins A, D, E and K, the synthesis of certain hormones, and are the component of cellular membranes. They are essentially divided into saturated and unsaturated fats. The latter are found in fish, nuts, seeds, and oils extracted from them. They are recognised by the fact that at room temperature, as opposed to saturated fats, they are in a liquid state. Unsaturated fats are further divided into poly- and monounsaturated. Both groups are extremely important for our body. However, polyunsaturated fats are the only ones that

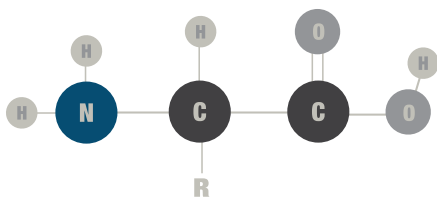


ABC OF DIET

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



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



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





WAY TO YOUR IDEAL BODY WEIGHT

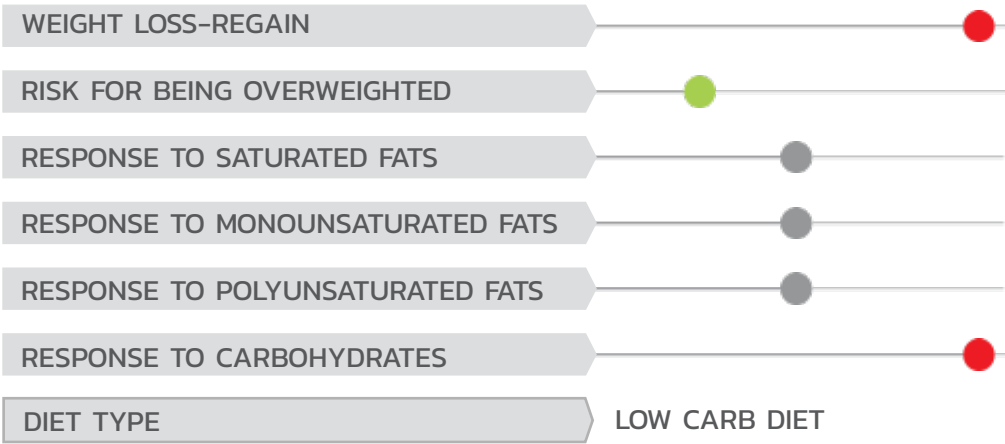
ADJUST YOUR DIET ACCORDING TO YOUR GENES

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

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

We advise you to follow our recommendations because the balance between the intake and the use of calories, physical activity and genetic background is the key to optimal body weight and well-being. It is generally not recommended to eat more calories than are actually burned. In addition to a controlled calorie intake, the right choice of foods is also crucial, as certain foods can cause even more harm, while other foods can improve your condition.

The fact, that a diet based on genetic analysis is truly effective, has been proven by scientific research performed at Stanford University. The study discovered that people who had been eating according to their genetic makeup had lost 4 kilograms more than those who had been trying to lose weight in no accordance with their genetics.



WEIGHT LOSS-REGAIN

Weight loss-regain can be a never-ending cycle. Statistics shows that about 80 percent of people who lose weight regain their kilos after one year. There are mainly two reasons why this happens:

1. people choose restrictive short-term diets, which are hard to follow in the long-term;
2. most people lose their motivation to continue with the diet after achieving their goals. However, there's another reason; namely, tendency to gain weight back has also a genetic background.

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



YOUR RESULT:

MORE LIKELY TO GAIN WEIGHT BACK

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

Recommendations:

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

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

RISK OF BEING OVERWEIGHTED

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 the 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.

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.

RESPONSE TO SATURATED FATS

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



YOUR RESULT:

NORMAL RESPONSE

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

Recommendations:

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

WHY WE NEED THEM

source of energy for the body

CAN OUR BODY PRODUCE THEM

yes

THEIR INFLUENCE

increase LDL, slightly increase HDL

THEIR ADVANTAGE

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

WHERE ARE THEY FOUND

animal meat, milk and dairy products, coconut and palm oil

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

RESPONSE TO MONOUNSATURATED FATS

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



YOUR RESULT:

NORMAL RESPONSE

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

Recommendations:

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

WHY WE NEED THEM

source of energy, growth, development, functioning of the heart and nervous system

CAN OUR BODY PRODUCE THEM

yes

THEIR INFLUENCE

visibly reduce LDL and triglycerides and increase HDL

THEIR DISADVANTAGE

less suitable for preparing hot meals – form trans fats

WHERE ARE THEY FOUND

almonds, hazelnuts, walnuts, cashews, seeds, olive oil

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

RESPONSE TO POLYUNSATURATED FATS

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

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



YOUR RESULT:

NORMAL RESPONSE

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

Recommendations:

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

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

WHY WE NEED THEM

source of energy, growth, development, the functioning of the heart and nervous system

CAN OUR BODY PRODUCE THEM

no

THEIR INFLUENCE

visibly reduce LDL and triglycerides and increase HDL

THEIR DISADVANTAGE

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

WHERE ARE THEY FOUND

rapeseed oil, corn, flaxseed oil, pumpkin seed oil, fish oil and fish, spinach, peanuts

RESPONSE TO CARBOHYDRATES

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

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



YOUR RESULT:

UNFAVOURABLE RESPONSE

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

Recommendations:

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

WHY WE NEED THEM

source of energy, bone- and cartilage-building

DEPRIVATION

decrease of body and muscle mass, malnourishment, bad mood

WHERE CAN THEY BE FOUND

cereal products (bread, cereals, pasta), vegetables, fruit

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.

DIET TYPE

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

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

YOUR RESULT:

LOW CARB DIET

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

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

An optimal daily calorie intake:

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

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

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

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

Your recommended daily percentages
of basic nutrients:

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

Recommendations:

MEAT AND FISH

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

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

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

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

MILK AND DAIRY PRODUCTS

Drink a glass of milk, or eat yoghurt every day. Yoghurt contains probiotic bacteria which regulate our digestion. Have a whole wheat bun with your yoghurt or add it to your favourite cereal.

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

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

OILS, NUTS AND SEEDS

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

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

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

LEGUMES, VEGETABLES AND STARCHY FOODS

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

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

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

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

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

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

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

FRUITS

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

GENERAL RECOMMENDATIONS

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

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

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

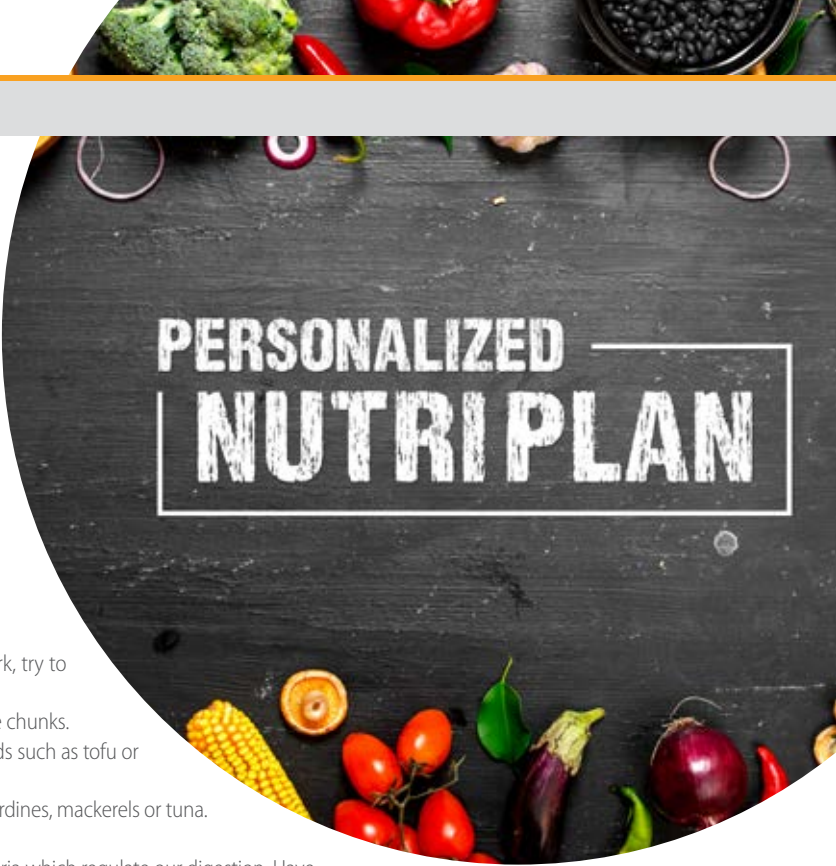
In general, avoid adding sugar and instead of fruit yoghurt, opt of a regular one.

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

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

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

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



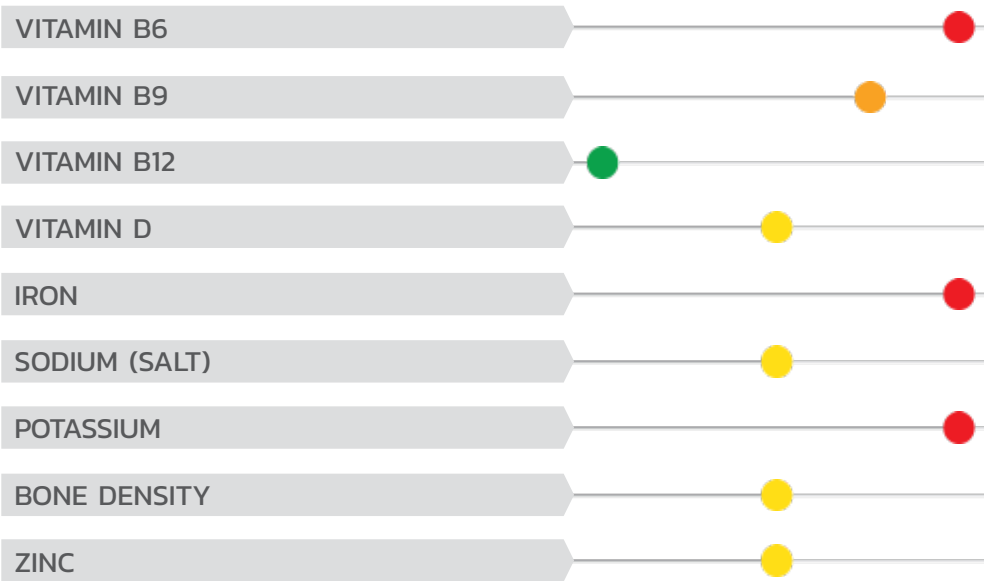


WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

MICRONUTRIENTS PLAY AN IMPORTANT PART IN YOUR HEALTH

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

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



VITAMIN B6

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



YOUR RESULT: LOW LEVEL

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

Recommendations:

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

WHY WE NEED IT

fat metabolism, appropriate functioning of the nervous system, a healthy skin

EFFECTS OF THE LACK

muscle cramps, disruption in the functioning of the nervous system, skin changes

WHERE IS IT FOUND

yeast, liver, legumes, fish, whole wheat cereal

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

VITAMIN B9

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

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



YOUR RESULT: LOWER LEVEL

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

Recommendations:

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

WHY WE NEED IT

red blood cell maturation, DNA and RNA synthesis

THE EFFECTS OF THE LACK

the reduction in number of blood cells

WHERE IS IT FOUND

green leafy vegetables, fruit, beer yeast

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

VITAMIN B12

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

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



YOUR RESULT:

HIGH LEVEL

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

Recommendations:

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

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



WHY WE NEED IT

red blood cell maturation, the functioning of the nervous system, DNA synthesis

THE EFFECTS OF THE LACK

anaemia, psychological disorders, bad eye sight

WHERE IS IT FOUND

beef, pork, offal, eggs, milk and dairy products

VITAMIN D

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

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



YOUR RESULT:

AVERAGE LEVEL

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

Recommendations:

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

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

WHY WE NEED IT

calcium absorption from intestines into the blood, the formation and regeneration of bones

THE EFFECTS OF THE LACK

incorrect growth and healing of bones, rickets, occasional muscle cramps

WHERE IS IT FOUND

milk, beer yeast, fish oil, sardines, salmon, tuna, liver



IRON

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

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



YOUR RESULT:

LOWER LEVEL

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

Recommendations:

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

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

WHY WE NEED IT

oxygen supply to the body, enzyme function

THE EFFECTS OF THE LACK

anaemia, fatigue, weakened immune system

WHERE IS IT FOUND

pork, beef, liver, red meat, mussels, egg yolk, nuts, beans, oatmeal



SODIUM (SALT)

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



YOUR RESULT:

AVERAGE SENSITIVITY

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

Recommendations:

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

WHY WE NEED IT

normal functioning of the nerves and muscles, influence on the blood pressure, carbohydrate digestion

THE EFFECTS OF THE LACK

dehydration, disrupted digestion of carbohydrates, muscle cramps

WHERE IS IT FOUND

salt, mineral water, cheese, mussels, red beet, meat

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

POTASSIUM

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

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



YOUR RESULT: LOWER LEVEL

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

Recommendations:

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

WHY WE NEED IT

nervous impulse transfer, muscle contraction, maintaining an appropriate blood pressure

THE EFFECTS OF THE LACK

loss of fluid, weak blood flow, fatigue, weakened muscles, disrupted heart rhythm

WHERE IS IT FOUND

oranges, bananas, avocado, melons, broccoli, tomatoes, dried apricots, raisins, fish, carrots

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

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:

AVERAGE BONE DENSITY

The analysis of genes responsible for bone strength has shown that you have favourable as well as unfavourable genes present, which determines an average bone density.

Recommendations:

- In addition to your genetic makeup, appropriate physical activity and an appropriate diet influence bone density, and we advise you to follow our recommendations.
- Calcium is most crucial for healthy bones, and we, therefore, recommend that you consume 1100 mg of calcium daily.
- Enough calcium can be found in chicken and turkey liver, dried figs, dandelion and sesame seeds. The latter contain almost 6-times more calcium than can be found in milk.
- Mineral water can also be a source of calcium. If you do not like milk, bear in mind that 1 litre of mineral water contains as much calcium as two glasses of milk.
- We recommend that you follow the instructions from the "Vitamin D" analysis, because vitamin D is crucial for the absorption of calcium from the intestines into the blood.
- We recommend that you eat broccoli, cabbage and black currant. Such foods contain a lot of vitamin C, which is important for collagen synthesis (organic part of bones).

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 on one of the hips, and on people under 50 also on the wrist. The examination is safe and simple, and it is conducted in only a few minutes.



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

ZINC

Zinc is an essential trace element and it is the second most common mineral in the body (after iron). It is vital for the functionality of **more than 300 enzymes**, for DNA stabilisation and gene expression. One of the main health benefits of zinc is enhanced immune function. As such, it is used for example in the treatment of the common cold as it can help relieve symptoms by reducing inflammation in the nasal cavity. Beyond this, zinc plays an important role in protein synthesis, body growth, blood clotting, insulin function, reproduction, vision, taste and smell. Zinc also aids in wound healing as it helps to stick skin and mucous membranes together.

Low levels of zinc may increase susceptibility to infections. Zinc deficiency is more common among older people as well as in vegetarians since red meat and other animal products are rich in zinc. Zinc is also present in some plants. However, the absorption of zinc from plant sources is less effective. In the scientific research on which our analysis is based it has been shown that genetics can influence a person's zinc blood levels. CA1, PPCDC and NBDY genes have all been shown to be significantly associated with a person's blood levels of zinc.



YOUR RESULT:

AVERAGE LEVEL

The DNA analysis has shown that you have favourable as well as unfavourable genetic variants present, which means you fall within the most common group of people with an average efficiency of zinc absorption.

Recommendations:

- Adequate levels of zinc help you to keep your immune system strong and can help protect you from infections.
- We recommend you consume not less than 13 mg of zinc on a daily basis.
- An 85 g serving of lamb contains around 6.7 mg of zinc and one cup of yogurt contains 1.6 mg of zinc.
- Meat, poultry, seafood and dairy products are among the best sources of zinc.
- Vegetables rich in zinc are especially kidney beans, chickpeas, cashews, sesame seeds and almonds.
- Bioavailability of zinc is lower in plant foods than animal foods because of phytates. The inhibitory effect of phytates can be minimised by soaking, heating, sprouting and fermenting. Absorption of zinc can be also improved by using yeast-based breads and sourdough bread, sprouts, and presoaked legumes.

WHY WE NEED IT

It is distributed throughout the brain, kidneys, muscles and eyes, and in men, the prostate gland. It is directly involved in cell division, helping to make new cells, keep the immune system active and keep enzymes working at their optimum.

THE EFFECTS OF THE LACK

reduced growth, skin lesions and reduced immune function

WHERE IS IT FOUND

ysters, beef, whole-grain wheat, legumes, pumpkin seeds, nuts, eggs and dairy foods

Premenstrual syndrome (PMS) affects from 8 to 15 percent of women during their childbearing years. Researchers have shown that a supplement of at least 15 mg zinc a day may lower the chances of PMS and at the same time decrease menstrual cramps during periods.



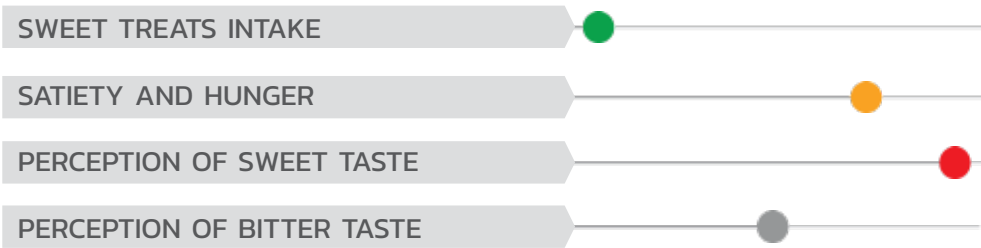


IMPORTANT INFLUENCES ON YOUR EATING HABITS

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 of the matter is that, apart from the environment, it is also our genetic makeup that influences our eating habits.



SWEET TREATS INTAKE

Have you ever noticed that some people opt for sweet treats more often than others? Or, perhaps you are asking yourself why it is precisely you who finds it hard to resist sweet treats during the day? Perhaps it is not only your decisions that are to blame because it has been discovered in a recent study that also one of your genes is responsible for this. Scientists have discovered that a tendency for sweet treats can be predicted from a genetic makeup of an individual.

It has been proven that the **gene ADRA2A** is responsible for this characteristic, as it is involved in the transfer of messages to the brain, where the information from the environment is appropriately processed and interpreted. More than 1 000 people have participated in the research, and they had to record all the food they had consumed over an extended period of time. It has been proven that people with an unfavourable ADRA2A gene variant reach for sweet products much sooner than those who do not have this variant.



YOUR RESULT:

LOWER TENDENCY

You have favourable copies of the ADRA2A gene present on both chromosomes, determining a lower intake of sweet treats. Approximately 48 percent of people have such a genetic makeup.

Recommendations:

- Your genotype is a favourable one, because it protects you from too strong desire for sweet treats.
- When you are overpowered by the urge to have something sweet and you are at home, clean your teeth immediately. This will discourage you from eating sweet food, and if you eat it anyway, it will have an unpleasant taste.
- Instead of unhealthy vices choose healthy fruit, which also contains a lot of sugars, but your body burns them more slowly.
- Great substitutes for sweet vices are also rice waffles covered with honey or yoghurt.
- When you will successfully fight your sweet cravings for a couple of times, this urge will start to decline.

Make a simple test. Put a small amount of sugar on your tongue. At first, you'll feel the sweet taste, which, after several repetitions of this test will become less definite. Is this not a proof that you can limit your consumption of foods containing white sugar?

SATIETY 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.



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.

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.

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.

PERCEPTION OF SWEET TASTE

Tasting is a process in which also smell and sight play an important role, but the main organ for tasting is actually the tongue. The tongue is covered with numerous taste buds which contain taste receptors. When they come in contact with a certain substance, a signal is transmitted to the brain, which then tells us what the taste of the substance is. Based on this we differentiate four basic tastes: sweet, salty, sour and bitter.

An important gene which determines the intensity of the perception of sweet taste is the **gene SLC2A2**. Scientists have discovered its role in a study that observed the relation of SLC2A2 gene variants to food type and, consequently, the sugar amounts that people consume.

It has turned out that people with an unfavourable variant of the SLC2A2 gene consume daily many more sugars than people with a favourable variant. The reason for this is a less intensive perception of sweet taste. As a result, the carriers of the unfavourable variant of the SLC2A2 gene tend to sweeten their food much more for the same effect.



YOUR RESULT:

LESS INTENSIVE

Analysis of your DNA has shown that you are the carrier of one rare and one common copy of SLC2A2 gene. For this reason your sweet taste perception is less intensive, which is, in this case, unfavourable. Approximately 25 percent of people have such a genetic makeup.

Recommendations:

- Because of a less intensive perception of sweet taste, a higher intake of sugar is typical for people with your genotype. You can successfully resist this by taking appropriate measures.
- We recommend that you use less sugar when baking pastry, although you might think that you should use more. The only reason for this is your perception.
- Give up sweetening out of habit. Initially, food will seem less tasty, but later your organism will partially adapt to this.
- Avoid sweetening coffee, tea, cocoa and lemonades. Bear in mind that, by sweetening them, you will, decrease the positive effects that these drinks have.

The only mammals that do not taste sweet are the family of cats. On their taste buds, cats do not have receptors to detect sweet taste. According to scientists, one of the only two genes that are required for the formation of the sweet receptor has become non-functional. Unlike dogs, cats, therefore, simply are not moved by candy.

PERCEPTION OF BITTER TASTE

A 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 to bitter taste. Approximately 80 percent of people in the study, who were carriers of two common copies of TAS2R38 gene, did not detect a 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 to taste 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 one common and one rarer copy 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 very 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.

In 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.

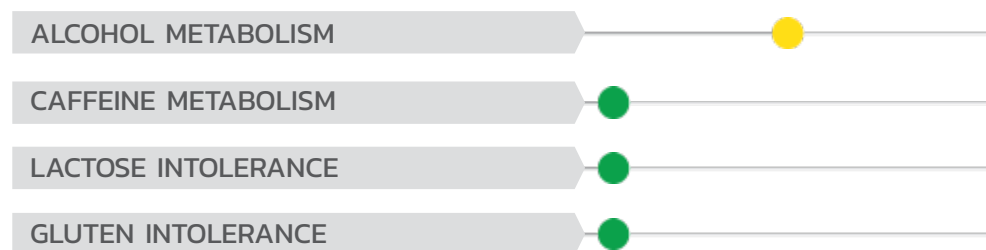


THE EFFECTIVENESS OF YOUR METABOLISM

GENES HELP YOU LEARN ABOUT YOUR BODY'S METABOLISM

Our body, with the help of specific enzymes, processes or breaks down lactose, caffeine 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

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:

LESS EFFECTIVE METABOLISM

Your ADH1 gene determines a reduced enzyme activity, but you also have two favourable copies of the ALDH2 present. Your alcohol metabolism is, therefore, slightly less effective.

Recommendations:

- Your genetic makeup determines that during alcohol metabolism harmful substances can accumulate and cause slight problems.
- When drinking alcohol, you most likely get less visible signs or only one of the following signs: a redness of the face, head-ache, nausea or unpleasant itching and increased heart rate.
- Dilute your alcoholic beverage with water, mineral water or juice.
- For quenching your thirst after a long day, have a glass of refreshing lemonade or tonic, instead of an alcoholic beverage.
- 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 consuming higher amounts of alcohol.

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

CAFFEINE METABOLISM

Caffeine is a natural alkaloid, most commonly known as the main ingredient of coffee. It is metabolised in the liver by the enzyme, called CYP1A2. This enzyme is responsible for up to 95 percent of the entire caffeine metabolism, and it is, therefore, not surprising that a mutation in the **CYP1A2 gene** has an important influence on the enzyme activity and, consequently, the caffeine metabolism.

People with one or two mutated copies of the CYP1A2 gene metabolise caffeine more slowly, and as a result, feel a greater effect of coffee. But this is not as favourable as it may seem, because these people have a higher blood pressure after drinking coffee than those with a rapid caffeine metabolism. Researchers have proven in many studies that people with slower caffeine metabolism are more susceptible to medical conditions related to increased blood pressure. We, therefore, recommend them to adjust the daily dose of caffeine accordingly.



YOUR RESULT:

RAPID METABOLISM

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

Recommendations:

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

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

LACTOSE INTOLERANCE

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

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



YOUR RESULT:

EFFECTIVE METABOLISM

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

Recommendations:

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

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

GLUTEN INTOLERANCE

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

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



YOUR RESULT:

LOW LIKELIHOOD

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

Recommendations:

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



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



YOUR GENES, DETOXIFICATION AND ANTIOXIDANTS

GENES CAN ALSO INFLUENCE YOUR PHYSICAL APPEARANCE

In this chapter you will learn about your selenium and vitamin C and 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.



OXIDATIVE STRESS

Oxidative stress occurs as a consequence of an imbalance between the formation of free radicals and the ability of our body to neutralise them on time. Our body actually has many enzymes available for preventing oxidative stress. These enzymes are responsible for the protection against harmful environmental influences such as cigarette smoke, exhausts, smog, radiation, vapour of industrial solvents used for the production of plastic mass, medication etc. Two of the most important enzymes are quinone oxidoreductase and catalase. A mutation of DNA can occur in both genes, and this influences their functioning and our exposure to oxidative stress. We have analysed the sequences of the two mentioned genes, and determined, on the basis of the genetic makeup, to what extent you are exposed to oxidative stress.



YOUR RESULT:

LOWER EXPOSURE

Your genetic makeup determines a normal enzyme quinone oxidoreductase level and a normal activity of the catalase enzyme, manifesting in lower exposure to oxidative stress.

Recommendations:

- Your organism fights oxidative stress optimally, but following our recommendations is not redundant.
- We recommend that you consume at least 100 mg of vitamin C per day. Eat foods such as peppers, broccoli, kiwi, apples and oranges, as they contain enough vitamin C.
- Eat many vegetables that contain coenzyme Q10. Our body produces it, but as years go by, its production decreases. Coenzyme Q10 can be found in broccoli, spinach and nuts.
- Bear in mind that the combination of alcohol and smoking highly increases the formation of free radicals. You will contribute the most to a lower exposure to oxidative stress by limiting alcohol and smoking.
- But mostly try to stick to daily requirements of selenium and vitamin E, because they all belong to the group of antioxidants.



Did you know that, by storing fresh fruits, their vitamin C content drops? The level drops by 50 percent when stored in cold, and when stored under normal temperature, by spring the level has dropped to 2/3 of the after-harvest rate. Thus it is best to consume raw fruits and vegetables to ensure we consume more of this antioxidant.

VITAMIN E

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

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



YOUR RESULT:

AVERAGE LEVEL

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

Recommendations:

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

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



ROLE

protects against oxidative stress

CONSEQUENCES OF ITS LACK

the build-up of free radicals

WHERE IS IT FOUND

olive oil, wheat sprouts, cabbage, corn, soy, wheat, rice, avocado, olives, carrots, tomato, almonds

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 40 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.

A typical sign of people who consume excessive amounts of selenium is a characteristic smell of garlic, even if the person hasn't consumed any. By taking into account our recommendations this couldn't occur, as the person would need to consume 100-times more selenium than the recommended value.



WHY WE NEED IT

an important antioxidant, immune system defence, detoxification

CONSEQUENCES OF ITS LACK

lack of energy, unhealthy skin, weakened immune system

WHERE IS IT FOUND

seafood, liver, cereal sprouts, bran, tuna, onion, broccoli, garlic, brown rice

VITAMIN C

Vitamin C, also known as ascorbic acid, is a water-soluble vitamin, found in different kinds of fruits and vegetables. Our body is not able to synthesise vitamin C, which means sufficient intake of vitamin C is very important for our health. Its primary function is boosting our immune system. It protects cells and keeps them healthy, prevents scurvy and helps with the healing of wounds. It is also important for collagen production, while it's also known to help with lowering hypertension.

Dietary vitamin C is transported in the human body by two transporter proteins, one of which is encoded by the **SLC23A1 gene**. A variant of this gene causes reduced absorption of vitamin C and is associated with a lower level of plasma vitamin C. The SLC23A1 gene was identified to be associated with circulating concentrations of L-ascorbic acid in the general population, which indicates that people with the mutation present should increase their intake of vitamin C.



YOUR RESULT: **HIGH LEVEL**

You are a carrier of a favourable genetic makeup, which determines that you shouldn't experience problems related to vitamin C absorption.

Recommendations:

- Your genetic makeup protects you from a lack of vitamin C. To maintain this, we suggest you follow our recommendations and keep it on a similar level.
- We suggest you consume around 100 mg of vitamin C with food per day. Such an intake should maintain your vitamin C at a similar level.
- To maintain an appropriate level of vitamin C, we suggest you eat a moderate amount of vegetables such as turnips, cabbage, peas, Brussels sprouts and potatoes; and fruits, namely strawberries, pineapple, guava and apricots.
- To additionally diversify your diet and keep a healthy level of vitamin C you can introduce star fruit, litchis, kumquats, sun-dried tomatoes and saffron to your meal plan.

Did you know that, by storing fresh fruits, their vitamin C content drops? The level drops by 50 percent when stored in cold, and when stored under normal temperature, by spring the level has dropped to 2/3 of the after-harvest rate. Thus it is best to consume raw fruits and vegetables to ensure we consume more of this antioxidant.



WHY WE NEED IT

for producing skin, tendons, ligaments and blood vessels, healing wounds and forming scar tissue, repairing and maintaining cartilage, bones and teeth

CONSEQUENCES OF ITS LACK

scurvy, dry and splitting hair, gingivitis and bleeding gums, dry skin, decreased wound-healing rate, easy bruising, nosebleeds

WHERE IS IT FOUND

bell peppers, dark leafy greens, kiwi fruit, broccoli, berries, citrus fruits, tomatoes, peas, papaya

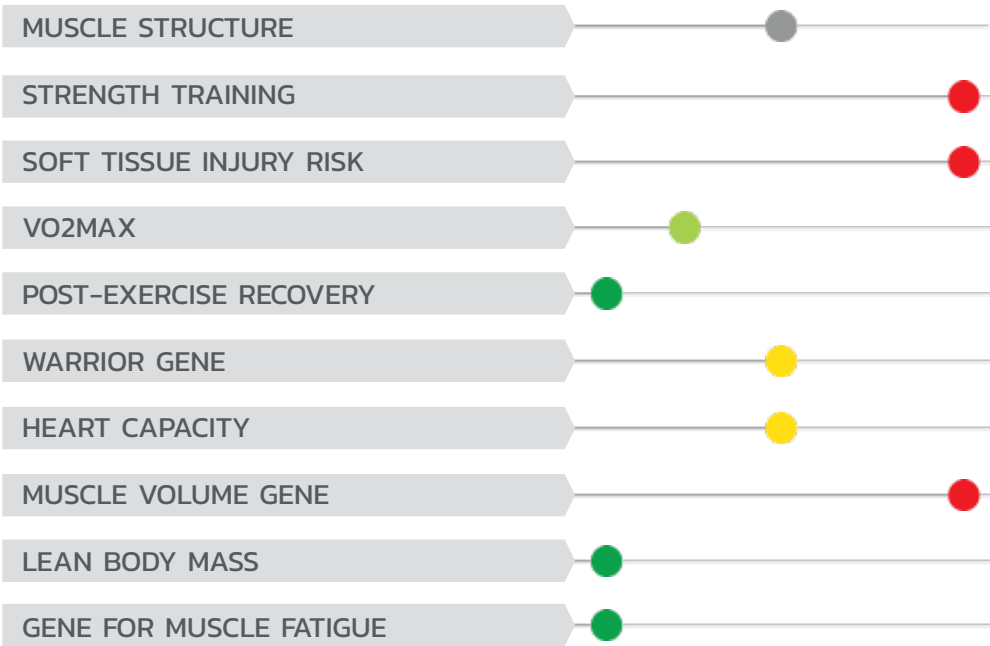


SPORTS AND RECREATION IN TUNE WITH YOUR GENES

DISCOVER THE WORKOUT MOST SUITABLE FOR YOU

In this chapter we will reveal to you the sports activities that you can be good at on the basis of your muscle structure. You will 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

The Muscle structure analysis holds answers about your muscle type and assesses your strength/endurance performance potential. We test two genetic variants within the **ACTN3 gene** and the **PPARalpha gene**, which affect our physical fitness and greatly influence the fact that some people are better at sports where strength and power are required, while others are "marathoners" in their nature.

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



YOUR RESULT:

GREATER MUSCLE ENDURANCE

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

Recommendations:

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

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

MUSCLE STRUCTURE, BODY AND TRAINING

Distribution of fibre types in each body is not homogenic. Most of the people have a similar percent of slow twitch and fast twitch fibres distribution, which makes us human a hybrid, universal athletes, potentially good in aerobic and strength tasks. So, having an extra-high dominance of any kind of fibres is more an exception than a norm. An interesting fact is that distribution of fibre types in each body is not homogenic. Deeper muscles, which are close to the skeleton tend to be slow, which, together with their mechanical properties make them a better stabilizer muscles. On the contrary, superficial, global muscles tend to have a fast twitch fibre dominance, which, together with their leverage advantages, makes them a better movers and a moment producers.

The relationship between intensity, reps and sets with the associated type of adaptation:

One-rep maximum (1RM)	Approximate number of repetitions	Optimal number of sets (look at Note)	Training effect
95-100	1 to 3	10-20	Max strength
85-95	3 to 6	5-10	Strength
75-85	6 to 10	3-6	Hypertrophy & endurance
65-75	10 to 20	2-5	Explosive power, endurance, some hypertrophy
55-65	20 to 35	1-3	Endurance

Note: All the numbers in the table are approximates, since the number of reps with a given load depends on few other factors, such as fiber dominance (ST or FT), muscle groups involved (arms, legs or a torso) and gender (male of female).



STRENGTH TRAINING

Strength training can be defined as the use of resistance (e.g. barbells, dumbbells, rubber bands or bodyweight) for contracting muscles with the objective to acquire strength, muscular size or muscular endurance. If performed correctly, strength training can improve overall health and well-being, as well as bone health. It reduces the potential for injury and improves heart function. Strength training is associated with muscle tissue gain, and it is usually recommended for those who want to get rid of excess fat since a more “muscular body” burns more calories. It turns out that, according to our genetic makeup, different people respond to strength training in a different manner.

The scientific research studied people who had gone through a 12-week intensively progressing strength training program (aggressively increasing the amount of weight during the program). After finishing the program, in addition to an expected positive outcome, some people had gained approximately 6 percent more subcutaneous fats than others. This phenomenon is proven to happen in man due to our genetic uniqueness that influences our susceptibility to certain physical exercises. In case of women, these findings are not confirmed. This is not surprising because men and women have a unique inimitable system of fat accumulation and fat-burning.



YOUR RESULT:

LESS RECOMMENDED

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

Recommendations:

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

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

SOFT TISSUE INJURY RISK

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:

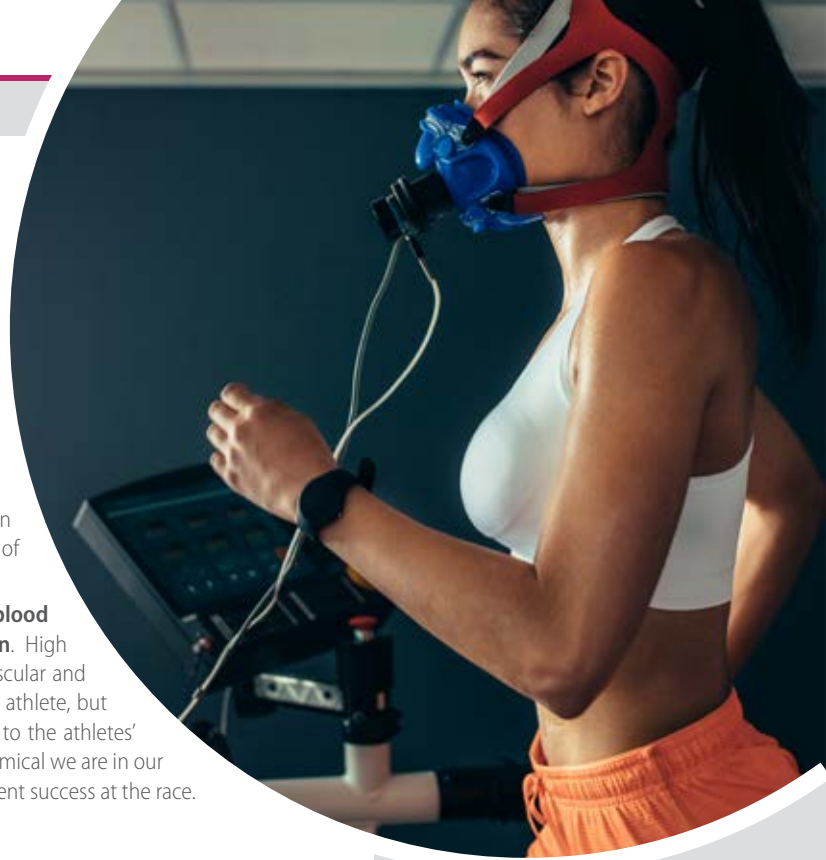
- Due to your genetic result, we recommend that you increase your warm up duration & intensity, especially in cold environmental conditions.
- Include additional stretching and strengthening exercises in your weekly training programs.
- During warm up, increase speed or jump height gradually.
- Depending 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 professional, 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 any 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.

VO₂max (YOUR AEROBIC POTENTIAL)

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 VO₂max point**. VO₂max therefore greatly influences our capacity to perform endurance exercise. VO₂max 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)).

VO₂max 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 VO₂max values require good interaction between the respiratory, cardiovascular and neuromuscular system. VO₂max 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 VO₂max but different success at the race.



YOUR RESULT:

HIGHER AEROBIC POTENTIAL

Our analysis has revealed that you are the carrier of such genetic variants which give you a moderate advantage in terms of your aerobic capabilities.

Recommendations:

- According to your genetic makeup, you have higher than average aerobic potential, which is favorable.
- Due to your favorable result it's expected that compared to people with low aerobic predisposition you have to work less for the same results.
- 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 higher aerobic potential.
- To get an idea of your current aerobic performance, the easiest way is to test for your VO₂max. Follow the instructions on this page and try to perform the very simple Queens College Step test.
- If you are a professional, you can go through a more precise VO₂Max measurement in a specified exercise physiology laboratory.
- If you are a beginner, steady state, low intensity (60-75%HRmax) aerobic exercise, lasting between 20 to 40 minutes, 3 times a week will be enough to increase your VO₂Max.
- But if you already have plenty of experience in endurance activities, elevating VO₂Max will require a more intensive interval training approach.
- Consulting a professional is highly recommended to make the planning accurate on the one hand and to avoid related injuries on the other.
-

In general, women reach about 15-30% lower VO₂max 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.

MEASURE YOUR CURRENT VO2max

You can measure your own oxygen capacity by approximating with a field test. The Queens College Step test is one of many popular variations of step test procedures, used to check your current VO2max. You only need a roughly 41 cm high step and a (stop) watch.

Procedure: step up and down on the platform at a rate of 22 steps per minute (females) and at 24 steps per minute (males). You have to step using a four-step cadence, ‘up-up-down-down’ for 3 minutes. After 3 minutes, stop immediately and count the number of heart beats for 15 seconds after 5-20 seconds of recovery. Multiplying this 15 second reading by 4 will give you the beats per minute (bpm) value to be used in the calculation below.

Scoring: an estimation of VO2max can be calculated from the test results, using the formula below:

men: $VO2max\ (ml/kg/min) = 111.33 - (0.42 \times \text{heart rate (bpm)})$

women: $VO2max\ (ml/kg/min) = 65.81 - (0.1847 \times \text{heart rate (bpm)})$

Rank your current aerobic fitness, using a VO2max norms chart:



Age (years)	Superior	Excellent	Good	Fair	Poor
20-29	56+	51-55	46-50	42-45	≤ 41
30-39	54+	48-53	44-47	41-43	≤ 40
40-49	53+	46-52	42-45	38-41	≤ 37
50-59	50+	43-49	38-42	35-37	≤ 34
60-69	46+	39-45	35-38	31-34	≤ 30
70-79	42+	36-41	31-35	28-30	≤ 27

Note that the Queens College Step test gives you a rough estimation about your VO2max. If you have some experience in long and middle distance running, another alternative for VO2max estimation may be a 3000m Cooper Test. Search the web for the instructions and norm charts. Advanced athletes can also go for a more precise Laboratory VO2max test, which is based on gas analysis and conducted under the exercise physiologists’ supervision.

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 produce 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:

FAST RECOVERY AFTER TRAINING

The analysis of the group of genes, involved in removal of Reactive-Oxygen-Species and inflammatory processes, shows that most of the eight genes analyzed are present in a favorable variant, which means from a genetic point of view you fall within “fast 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 best consider another day to recover.
- You can also consider using for example 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 from your diet, and instead include healthy, quality fats rich of omega-3 fatty acids into your diet, for lowering your level of 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, keeping a training diary 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.

WARRIOR GENE

Even with years of preparation and training, some people crack under pressure, while others seem to thrive on pressure and adrenaline. 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 adrenaline. While the AA carriers (Worriers) create the COMT enzyme with the lowest activity, which results in a high baseline level of adrenaline. The AG form comes somewhere in the middle.

For everybody there is an optimal level of adrenaline. The worrier is probably already at his/her optimal level therefore the automatic increase in adrenaline 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 adrenaline levels are normally low, the same challenging situation will cause an increase in adrenaline up to the optimal level.



YOUR RESULT:

IN BETWEEN WARRIOR AND WORRIER

The analysis of specific variant within COMT gene has revealed that you are the carrier of the AG genotype, which means you fall somewhere in between Warrior and Worrier type.

Recommendations:

- According to the result of the genetic test, your Warrior potential is not so strong compared to people with GG genotype, while compared to people with AA genotype, your Warrior potential is still better.
- In normal daily situations, your level of adrenaline is somewhere in between compared to the AA and GG carriers.
- In challenging situations, your level of adrenaline is just a little bit over the optimal level, therefore you crawl between warrior and worrier.
- Compared to the AA carriers you have a small advantage in stressful situations, as your head remains clearer.
- As you are the carrier of one A copy of COMT gene, you most probably possess some advantages typical for the AA carriers. It has been shown that the AA carriers get more pleasure out of life but also more misery (bigger highs and lows) and they are more creative in general.

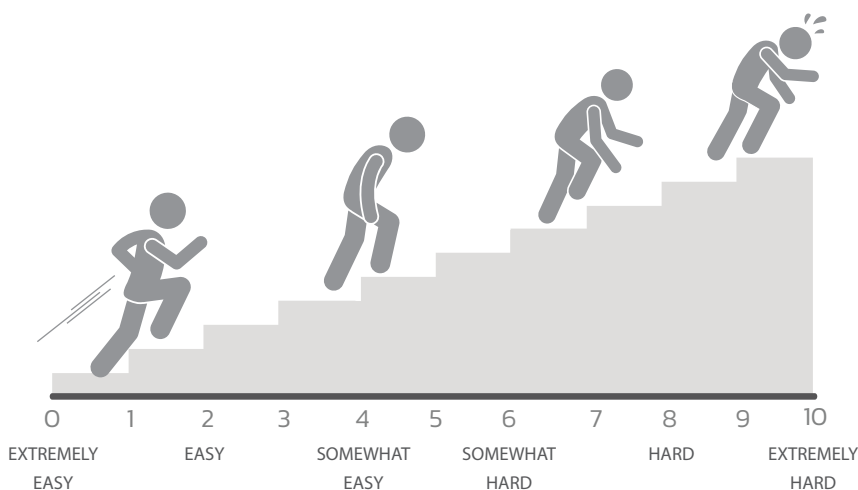


COMT is decreased by estrogen, such that overall COMT activity in prefrontal cortex and other tissues is about 30% lower in females than in males. This diminished COMT activity translates to about 30% higher baseline adrenaline levels in females than males.

HEART CAPACITY

Our heart pumps **about 5 liters of blood every minute** when we are resting, while during exercise it pumps about **5-times** as much blood as during rest. Our aerobic capacity depends on “central” factors - the ability of the lungs and the heart to bring oxygen to the working muscles, as well as on “peripheral” factors - the ability of those muscles to use the delivered oxygen in the process of producing fuel for a muscle contraction. A good heart condition is therefore an essential element which enables us to take advantage of our overall sport potential.

Regular physical activity is universally accepted as a central component of a heart-healthy lifestyle as it induces beneficial changes in the cardiac function (better heart capacity), which furthermore, importantly affects our aerobic capabilities. For example, a physically active individual can perform the same amount of physical work with less strain on the heart (indexed as lower heart rate and blood pressure during a given work output) than a sedentary person. This is due to the reason that our heart has to be able to actually transport the necessary amounts of oxygen to our muscle tissues. For example, your heart may not be able to pump enough blood with each beat – and since blood contains oxygen, this limits your oxygen capacity. Good heart capacity is therefore an important independent element of your overall aerobic capacity. In addition to this, better heart capacity is associated with improvements in traditional cardiovascular disease risk factors: lower blood pressure and plasma low-density lipoprotein cholesterol levels (LDL) and increased plasma high-density lipoprotein cholesterol levels (HDL).



OMNI scale - scale of perceived exertion

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



YOUR RESULT: **AVERAGE HEART CAPACITY POTENTIAL**

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

Recommendations:

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



MUSCLE VOLUME GENE

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

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



YOUR RESULT:

LOW MUSCLE VOLUME POTENTIAL

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

Recommendations:

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

HOW DO WE BECOME STRONGER?

We become stronger as a result of body's adaptation to a special stimulus, produced by a muscle loading during resistance training.

That stimulus should be greater than the ones we are used to, otherwise the system “doesn't feel” an urge to adapt. So strength training is quite about leaving the comfort zone behind.

Next, the adaptation is time and type of load dependent. From the TIME perspective, beginners progress pretty fast with weight training since the adaptation is mostly neurologic. It means that our inter-muscular and intra-muscular coordination becomes better. Sometimes, these kinds of gains are called “qualitative”, because muscles learn to perform better without getting bigger. Intramuscular coordination refers to an ability of a given muscle to be more engaged in a certain movement. In other words, how effective is the coordination between the muscle fibres of that single muscle. Inter-muscular coordination refers to the ability to coordinate the cooperation, timing and a level of engagement of all the muscles in your body during a certain move or exercise. While some muscles are in charge of moving a limb, others should stabilize the spine or be relaxed enough to “permit” the movement to happen. Usually, the first 2-3 month of strength training mostly improve this (quality) component.

When the ability to gain strength, mostly due to a neurological adaptation, starts to diminish, another form of adaptation permits us to keep on going with the weights. This is called muscle Hypertrophy (check out a corresponding topic for more information). This form of adaptation is called morphologic or “quantitative”, since it requires a new tissue formation: the muscles cross sectional area become larger and they have more contractile protein content inside. From the type of training perspective, we can adjust the type of preferable adaptation by “playing” with such components as volume, intensity and tempo (time under tension). While high loads and low repetition sets (RM 1-5) target mostly a neurological component of strength, higher rep's (RM 6-15) are associated with Hypertrophy stimulation, provided all other complementary circumstances are optimal. (Check out our RM chart for more information on this topic).

HYPERTROPHY AND MUSCLE VOLUME GENE

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

- **Frequency**

Frequency of training is crucial. When you lift weights, you cause damage to your muscles. This is often referred to as “microtrauma”. Microtrauma involves the tearing and shearing of delicate protein structures within your muscle cells. This may sound bad but in reality it is necessary for the initiation of growth after your workout. Results have shown that muscle mass increases are greater with three workouts per week, compared to those achieved with one workout per week. In addition, strength increases are on average 40% greater!

- **Nutrition**

It's essential to meet the needs of the exerciser: calorie intake, building material (proteins), proper hydration, vitamins, minerals and similar.

- **A good sleep**

While you exercise, you don't build up muscle mass, but in fact “damage” muscles so later they can recover and become larger and stronger than they were before. To recover and adjust, requires calories, protein, carbohydrates and other constituents of the diet. Muscle then grows while we rest and sleep, because some very important muscle-building hormones are released during sleep. Therefore, take special care to ensure a good night's sleep.

- **Focused training type**

For the hypertrophy-specific training cycle, keep unnecessary high-energy-demanding activities (long-distance running or cycling, boxing, step or aerobics classes) to a minimum, because they tend to be extremely catabolic (the opposite of anabolic) on the one hand and energy depleting on the other.

- **Manage your stress**

High stress levels may slow down your growth, since stress hormones (like cortisol and adrenaline) that produce a sympathetic “background” for a long period of time also have a catabolic effect on muscle tissue.



LEAN BODY MASS

Lean body mass (LBM) is a term for your total body weight without the fat. It is also called “fat-free” mass and includes the weight of your muscles, bones, organs and skin. Your lean body mass status determines whether or not you are more likely to have higher body muscle mass and lower fat levels. Optimal lean body mass percentage is 80 to 85 percent of total weight for men and 75 to 80 percent for women.

Lean body mass is strongly influenced by genetics with heritability ranging from 52 to 84 percent. If you are genetically predisposed to have higher lean body mass, you have a better chance of attaining a muscular body through fitness exercises. Having a high lean body mass also has many health benefits far beyond just looking like a swimsuit model. Lean body mass percentage affects your metabolism and energy level and impacts your strength and agility. Higher lean body mass decreases the likelihood of excessive body weight, obesity, impaired protein balance and osteoporosis.



YOUR RESULT:

HIGHER POTENTIAL

The analysis has shown that your genetic makeup gives you an advantage for high lean body mass. Approximately 39 per cent of people have such a genetic makeup.

Recommendations:

- You have a better predisposition for a higher lean body mass, what indicates that you have a better chance of attaining a muscular body through fitness exercises than the average population.
- Having a genetic predisposition for a higher lean body mass is good because muscles are metabolically active and increase your metabolic rate, making it easier to maintain an overall healthy weight.
- Make sure to consume enough proteins. Good sources of proteins include eggs, low-fat dairy, lean steak, white-meat poultry and fish. An egg, for example, contains 12 g of protein and 100 g of chicken breast contains 15.8 g of protein.
- Staying properly hydrated is critical to building muscle. By drinking enough water before, during, and after your workouts, you can significantly increase your performance.

Building muscles requires getting an adequate amount of sleep each night—ideally at least seven to eight hours. During sleep, our bodies release growth hormone and testosterone, which allow the muscles to recover and grow following a hard workout. Without sufficient sleep, your efforts to build muscle will be severely compromised.

GENE FOR MUSCLE FATIGUE

Muscle fatigue can be one of the main obstacles which can prevent athletes from achieving their maximum potential. During exercise, contracting muscles produce lactate and hydrogen ions as a result of a process called glycolysis. Small amounts of lactate operate as a temporary energy source. However, accumulation of lactate during high-intensity exercise can create a burning sensation in muscles and limits muscle contraction, resulting in muscle fatigue. Thus, our body has a system to transport lactate out of muscle cells.

A molecule called monocarboxylate transporter 1 (MCT1) is responsible for the export of lactate across the muscle cell membrane. Specific mutation within the MCT1 gene influences the amount of MCT1 transporters produced and, in this way, affects the rate at which lactate is cleared out of our muscle cells. And this can further influence how quickly someone feels fatigue and can also impact recovery time after a workout.



YOUR RESULT:

FASTER LACTATE REMOVAL

You are the carrier of two favourable copies of the MCT1, which determines faster removal of lactate from muscle cells. Approximately 13 per cent of people in the population have such variant of the MCT1 gene.

Recommendations:

- You fall within the group of AA carriers, who have been shown to produce the highest amounts of MCT1 transporter which is associated with a lower degree of muscle fatigue.
- A faster removal of lactate and therefore faster recovery time is beneficial for athletes with an intense training programme.
- Performing an active cool-down after a workout will help clear lactate even more quickly than simply resting.
- We recommend you do not forget about sufficient intake of magnesium. It is required for the production of high-energy molecules (ATP) and it is crucial in decreasing the accumulation of lactic acid.
- What is more, magnesium is also one of the electrolytes which will help you to maintain fluid balance in your body during and after the workout.
- Foods rich in magnesium includes vegetables (turnip, kale and spinach), legumes (kidney beans) and seeds (sesame and sunflower seeds).



Researchers have found that beside muscle cells, brains cells can also use lactate as a fuel. It's actually lactate that keeps your brain working during prolonged aerobic exercise (like marathons) when blood sugar is exhausted.

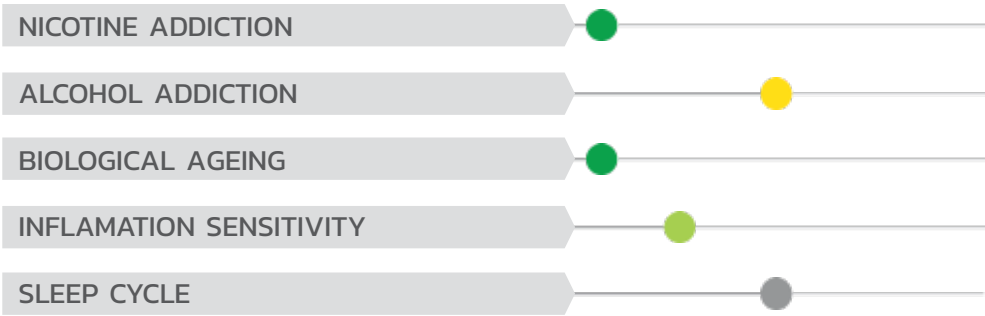


GENETICALLY DETERMINED AGEING AND INFLAMMATION

YOU CAN INFLUENCE AGEING AND INFLAMMATION

In this chapter, you will learn about how susceptible you are to nicotine and alcohol addiction. We will also reveal your sleep cycle and 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 a lifestyle, anyway? Lifestyle is a concept which had been established already in 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 of 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

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 the 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 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 for 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 in 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 average of non-smokers.

ALCOHOL ADDICTION

Alcohol addiction is a serious health problem, and, at the same time, a well-studied area for which genetic material is well-known to have an influence on. Alcohol addiction is expressed in behavioural and psychological problems. An individual continues to turn to alcohol, even though it is starting to visibly affect his physical and mental health. On the basis of a lot of research, we can say that our genetic makeup determines approximately 65 percent of our tendency for alcohol addiction. This research is based mainly on twin studies and numerous family studies, where it turned out that the tendency for alcohol addiction is passed down from generation to generation. On a molecular level, the basics of alcohol addiction are extremely complicated, because the occurrence is influenced by several genes, where every gene has a slight influence. We have included in your analysis the genes which were proven by many studies to have a strong influence on alcohol addiction.



YOUR RESULT:

AVERAGE RISK FOR ADDICTION

You have a combination of analysed genes present, which determines an average risk for alcohol addiction.

Recommendations:

- Your risk for alcohol addiction is average, but excessive alcohol drinking is definitely not recommended.
- Alcohol does not quench your thirst, but it dehydrates you. Therefore, do not make thirst an excuse for drinking alcohol.
- The time that you would normally spend for drinking, can be spent for your favourite activity. This way you will effectively redirect your thoughts.
- When you go to social events, order a non-alcoholic beverage or a beverage with low-alcohol content.
- Smaller amounts of alcohol can be beneficial for our health, but be careful, and control the intake.



In Europe, alcohol is the third leading cause of premature death and overall mortality. According to recent data from the World Health Organization, if we calculate the pure alcohol consumption per person aged over 15 years, Moldovans and Czechs drink the most.

BIOLOGICAL AGEING

We differentiate two types of ageing, chronological and biological. In a 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 the 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, on average, 3-4 years higher biological age of an individual with a mutated copy of the gene.



YOUR RESULT:

SLOWER AGEING

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

Recommendations:

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



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

INFLAMMATION SENSITIVITY

Inflammatory response is a vital part of the body's immune response. However, short-term and long-term inflammation should be distinguished. Short-term acute inflammation is a normal process in our body to recover after an injury or illness. It also occurs during recovery after exercise and influences muscle development.

On the other hand, prolonged short-term acute inflammation can lead to long-term chronic inflammation and this can further result in cardiovascular complications and some chronic diseases of modern society such as heart disease, atherosclerosis, diabetes, high blood pressure and asthma. Environmental factors that can contribute to the level of inflammation are lack of sleep, excessive stress and poor nutritional choices. Besides, genetics also play an important part in the level of inflammation. The most studied genes in this context are the **IL6, TNF, CRP and IL6R genes**, which all encode for the inflammatory molecules and are as such strongly involved in the regulation of inflammation.



YOUR RESULT:

LOWER SENSITIVITY TO INFLAMMATION

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

Recommendations:

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



SLEEP CYCLE

Do you like to wake up early in the morning or is it in the evening that you work best? Maybe is it just the opposite? It is because of your unique circadian rhythm, often called the “body clock”. Circadian rhythm is the 24-hour internal clock that is running in your brain and tells your body when to sleep, get up, eat and even regulates your body’s temperature and level of hormones.

Understanding your body’s internal clock is the first step towards better sleep and well-being. At the same time, it can help you to adjust day-to-day activities so that your results are optimal. The preference for being a “morning person” who enjoys waking up early or an “evening person” who likes to stay up late at night is partially written in your genes.

Individuals who carry one or two copies of the C allele of CLOCK gene are linked to eveningness and being more sleepy during the day. People with the T allele are more likely to be morning people and have less total sleep duration.



YOUR RESULT:

INTERMEDIATE TYPE

Our genetic analysis has shown that you are a carrier of genetic variants that indicate you are an intermediate type. You are in-between a morning and an evening person.

Recommendations:

- Your genetic makeup defines you as in-between a morning and an evening type.
- Having a routine at roughly the same time each day has a positive effect on our quality of sleep, metabolism and overall mood.
- One study has revealed that intermediate-type people reach peak performance 6.3 hours after waking. At this time, you should perform the most difficult mental or physical activities.
- If you have difficulties getting to sleep, we recommend that you are very strict in turning off the TV, computer, telephone or other electronic devices 1 to 2 hours before going to bed.

Scientists estimate that only about 5 percent of people are natural “short sleepers” who feel well rested after six hours of sleep or less. Are you among them?

YOUR SLEEP CYCLE PATERNS

Are you not sleeping well at night or waking up tired? Sleep problems may be caused by **lifestyle habits** (e.g eating habits, light exposure, circadian rhythm) **and genetics**.



Sometimes what appear like low quality sleep might just be because you live **incompatibility with your genetic makeup**. If you are an evening type, forcing yourself to get up earlier may result to be always feel sleep-deprived.



SLEEP CYCLE AND APPETITE REGULATION

Diferences in sleep cyclce have been associated with quality of sleep, obesity and also depression.

Short sleep is frequently connected with obesity and increased caloric intake. Several studies have demonstrated associations between short sleep and higher BMI. In studies that restrict sleep, people consume more calories, particularly from snacks. Better sleep might help people feel less hungry or have more willpower to stick to healthy choices.

HOW CAN I GET A BETTER NIGHT'S SLEEP AND BE HEALTHIER?

By using the following tips you can enjoy better sleep at night and improve how you feel during the day:

- **Keep a regular sleep-wake schedule:** Choose a bed time when you normally feel tired, try to go to sleep and get up at the same time every day. Whether it's 11pm to 7am or 2am to 10pm, always sleep on a consistent schedule. You will feel much more refreshed and energized than if you sleep the same number of hours at different times.
- **Avoid sleeping in:** It's better to choose for a daytime nap rather than sleeping in. In that way you won't disturb your natural sleep rhythm.
- **Nap smart:** Napping is a good way to make up for lost sleep. However, limit naps to 15 to 20 minutes in the early afternoon.
- **Find a career that suits your clock:** Working a 9 to 5 may not be the best idea for an evening type person. If you are able, choose a job that falls more in line with your natural circadian rhythm.
- **Avoid unhealthy snacks:** People who go to bed after 11pm are far more likely to indulge in unhealthy foods than those who go to sleep early (between 7pm and 11pm). They are also more likely to indulge in unhealthy snacks before going to bed, taking in an average 220 more calories each day. Whether you're an evening or a morning person, you should always eat nutrient rich food for optimum health, however evening person need to focus on this even more.



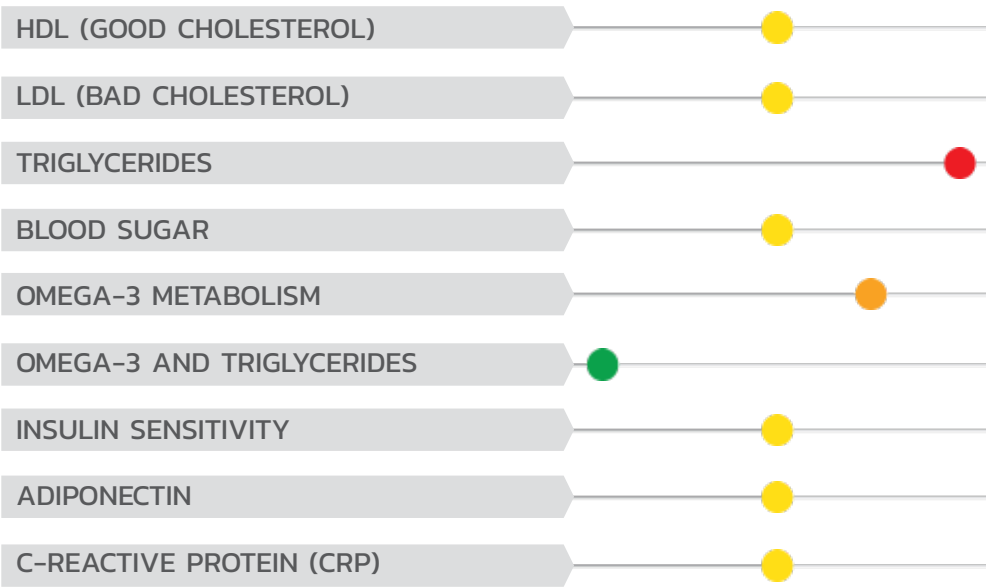
CARDIOVASCULAR HEALTH

WITH AN APPROPRIATE DIET YOU CAN PREVENT NUMEROUS HEALTH COMPLICATIONS

In this chapter, you will learn what levels of LDL and HDL cholesterol, triglycerides and blood sugar are determined by your genes. You will also learn how effective your metabolism of omega-3 fatty acids is, what is your tendency to high triglyceride levels and how efficiently your body regulates the level of insulin. In case of unfavourable genes, it is really important to appropriately adjust your diet and achieve a better health. Knowing your genetic predispositions to these and following the recommendations can lead you to better cardiovascular health.

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.

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



HDL (GOOD) HOLESTEROL

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 1 mmol/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.



LAY TERM

good or beneficial cholesterol

OPTIMAL STATE

as high as possible (above 1 mmol/l)

WHY IT DECREASES

genetic tendency, consumption of trans fats, not enough exercise, stress, smoking

WHY IS IT BENEFICIAL

inhibits LDL oxidation and eliminates it from arteries

Did you know that men, in comparison to women, have a lower HDL (good) cholesterol level? About one third of men and one fifth of women have HDL cholesterol levels lower than 1 mmol/l, which is far below the recommended level of HDL cholesterol.

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 to 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:

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.

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.



LAY TERM

bad cholesterol

OPTIMAL STATE

as low as possible (below 3 mmol/l)

WHY IT DECREASES

fatty foods, high-calorie intake, diabetes, genetic tendency, too little exercise, stress, smoking, alcohol

WHY IS IT BENEFICIAL

hardening of the arteries, interrupted blood flow, clogging of the arteries, heart attack, stroke

TRIGLYCERIDES

Triglycerides are actually a type of fat where our body stores energy. They are the most common fats in our body, and their level can quickly become too high. An acceptable level of triglycerides in the blood is less than 1.7 mmol/l, but it is often exceeded. The most common cause for this is a combination of unfavourable genes, an unhealthy diet, and an inappropriate lifestyle. People with a high triglyceride level (this condition is called hypertriglyceridemia) have an increased risk of a heart attack, and this is why it is crucial for our health to keep the triglyceride level as low as possible.

In the following analysis, you will learn the level of triglycerides determined by your genes. The most favourable genes encode a 70 percent lower triglyceride level, whereas the least favourable genes determine a 60 percent higher triglyceride level. It is crucial for carriers of less favourable genes to try to follow our recommendations.



YOUR RESULT: HIGH LEVEL

The analysis has shown the presence of genes which determine a high triglyceride level, and this is unfavourable.

Recommendations:

- Your genes determine a high triglyceride level, and we advise that you try to follow our recommendations to ensure that the level of triglycerides in your blood is lower than 1.7 mmol/l.
- We do not recommend the use of fat spreads such as butter, cheese spreads and patés. They contain saturated fats, which increase the triglyceride level.
- Try to limit the intake of sugar, desserts and artificially sweetened beverages. Foods that increase the blood sugar also potentially increase the triglyceride level.
- We also do not advise starving, which even further facilitates the increase of triglyceride level.
- Avoid stressful situations because stress is one of the main factors influencing the increase of triglyceride level.
- We recommend the use of unrefined, wholegrain flour as it contains fibre, which binds the excess fat.
- Consider soy products, which have an effect against triglycerides (at the same time, they reduce the LDL cholesterol). We recommend soy proteins, soy milk, tofu or miso.
- We recommend regular physical exercise, which represents a powerful factor in helping to reduce the triglyceride level.

LAY TERM

as low as possible

OPTIMAL STATE

genetic predisposition, diabetes, fatty foods, lack of exercise, stress, smoking, alcohol, added sugars

WHY IT DECREASES

atherosclerosis, heart attack, stroke

WHY IS IT BENEFICIAL

margarine, butter, lard, meat, salamis, whole milk and fatty cheese

Why is it harder to lose fat stores than muscle mass? Proteins that make up our muscles have a fifty percent lower energy level than triglycerides. Practically speaking, this means that triglycerides are twice as light. Therefore, more effort is needed to lower triglyceride levels and lose weight at the expense of excess fat tissue.

BLOOD SUGAR

After we consume carbohydrates, which are the most important source of energy, our body breaks them down into simple sugars, which are then absorbed into the bloodstream. The blood sugar level rises and special mechanisms have to make sure that it quickly drops to a basic level. In some people, this regulation is not adequate, and the blood sugar level drops to a basic level much slower, or it stays permanently increased. A certain influence, apart from diet, is also assigned to our genetic makeup. In various studies, scientists have identified the responsible genes, and now, with their analysis, we can determine whether you have to pay more attention to your diet because of the unfavourable variants of these genes. Certain mutations can occur in these genes, which influence the processes of blood sugar regulation, and these deficiencies can lead to a permanent increase in blood sugar. In our analysis, we have included the most reliable genes which have a great influence, and which represent an efficient tool for predicting your blood sugar level, determined by your genes.



YOUR RESULT:

AVERAGE LEVEL

Your genes determine an average blood sugar level, which is on the verge between favourable and unfavourable. You have variants of genes present which determine an increase of blood sugar, as well as those that reduce blood sugar.

Recommendations:

- Your genetic makeup is not the most favourable one, but your diet is crucial for regulating blood sugar, thus with it you can ensure an optimal blood sugar level, which is below 5.5 mmol/L.
- We recommend that you put foods on your menu which contain more zinc, since it helps to regulate blood sugar. We recommend, for example, tuna, low-fat cheese, whole wheat bread or unmilled rice.
- Try preparing tea out of bean husks, because it has antidiabetic properties (it protects against the increase of blood sugar).
- You can also reduce your blood sugar by adding less sugar to your food (coffee, doughnuts, and biscuits). It is even better to stop adding sugar altogether.
- Use lemon juice regularly, because citric acid in lemons reduces blood sugar level.

Did you know that glucose is the sole source of energy for the brain and in addition our brain cannot store it? A decrease in blood sugar level is thereby as unfavourable as a sudden increase. When your ability to concentrate decreases, it is very likely a sign that the blood glucose level began to drop.



WHY THE INCREASE

genetic tendency, obesity, added sugars, too little exercise, stress, high blood pressure

WHY IS IT DANGEROUS

atherosclerosis, heart attack, stroke, weakened immune system

HOW TO REDUCE IT

dieting, regular physical activity, food with low glycaemic load

OMEGA-3 METABOLISM

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

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



YOUR RESULT:

SLIGHTLY LESS EFFECTIVE METABOLISM

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

Recommendations:

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

WHY WE NEED OMEGA-3 FATTY ACIDS

they support the functioning of our heart and brain

DEFICIENCY

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

WHERE CAN WE FIND ALA

seeds and their oils (linseed, hempseed, rapeseed), nuts (walnuts, hazelnuts), soybeans and tofu

WHERE CAN WE FIND EPA & DHA

fatty fish (salmon, tuna, sardines) and algae

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

OMEGA-3 AND TRIGLYCERIDES

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



YOUR RESULT:

**OMEGA-3 ARE MORE EFFICIENT
AT LOWERING TRIGLYCERIDES**

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

Recommendations:

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



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

INSULIN SENSITIVITY

Insulin is a hormone responsible for decreasing our blood sugar after each meal. Individuals with low insulin sensitivity need more insulin to lower their blood sugar levels as their system is less efficient. Their body simply compensates for this by producing more insulin in order to keep blood sugar stable. However, high insulin production is not so favourable and is associated with a variety of health complications, such as damage to blood vessels, type 2 diabetes, high blood pressure and heart disease. This makes insulin sensitivity and insulin blood level a valuable marker of our health.

In addition to various lifestyle factors, our genetic background plays an important role in insulin sensitivity. It has been proven that specific genes may protect us from decreased insulin sensitivity. For instance, a recent study has shown that individuals with two protective variants of the **PCSK1 gene** have 60 percent higher insulin sensitivity in comparison to those with two common copies of the PCSK1 gene.



YOUR RESULT:

AVERAGE INSULIN SENSITIVITY

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

Recommendations:

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



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

ADIPONECTIN

Adiponectin is a hormone which regulates a number of metabolic processes. It reduces our appetite, enhances the ability of muscles to use carbohydrates for energy, and increases the rate at which our body breaks down fats. Through these processes, it promotes energy consumption. High adiponectin level is linked to higher HDL and lower triglycerides & LDL blood levels. Therefore, high blood adiponectin is widely accepted as a general protective marker against type 2 diabetes, obesity, atherosclerosis and some other cardiovascular diseases. Studies have shown that there is a strong genetic factor that influences adiponectin blood level.

The most studied gene in this context is the **ADIPOQ gene**. A rare variant of the ADIPOQ gene works towards increased production of adiponectin hormone, and it has been shown that people with one or two rarer variants of this gene regulate triglyceride level more efficiently.



YOUR RESULT:

AVERAGE ADIPONECTIN LEVEL

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

Recommendations:

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



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

C-REACTIVE PROTEIN (CRP)

C-reactive protein (CRP) is a protein whose production is elevated in response to various inflammation processes. For instance, infection causes inflammation processes in our body, which further triggers CRP production. CRP is also a good predictor of our cardiovascular health, since cardiovascular diseases are mainly caused by inflammation. Studies have proven that small and constant elevation of CRP is associated with the risk of cardiovascular diseases (CVDs) including heart attack. If this is the case (small and constant elevation of CRP), you may feel completely fine, but low-grade inflammation may lead to problems which become evident only years later.

Other factors which influence the level of CRP are for instance obesity, level of physical activity, stress, sufficient intake of some micronutrients and our genetic makeup. One of the most studied genes in this context is the CRP gene for which it has been proven that each copy of allele T allele decreases the blood level of CRP by approximately 20 percent.



YOUR RESULT:

AVERAGE CRP LEVEL

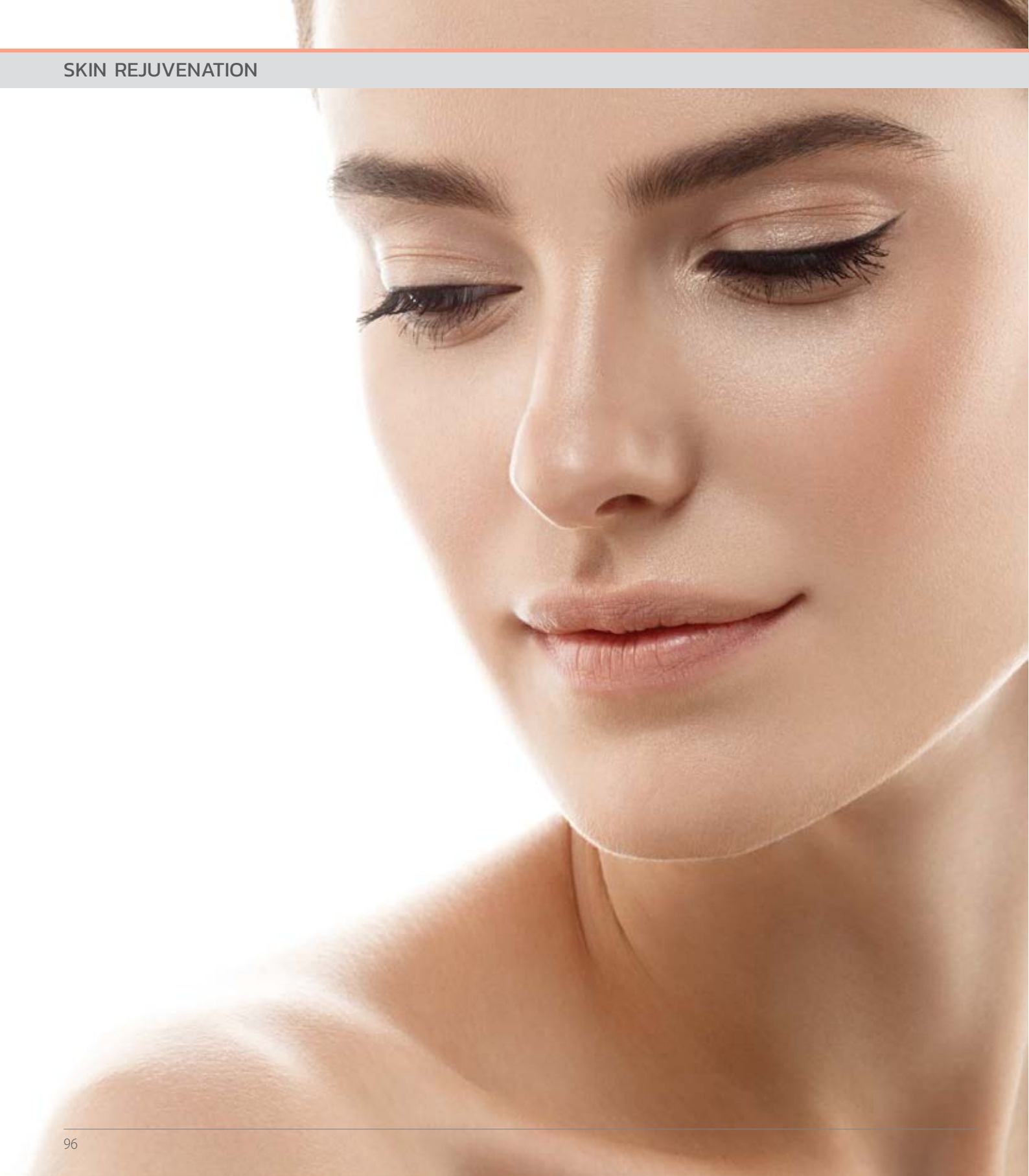
The analysis of your DNA has shown that your genetic makeup determines you are more likely to have an average CRP level.

Recommendations:

- Beside your genetic makeup, your CRP level still depends on many other lifestyle factors. Make sure to follow the recommendations on diet and lifestyle to keep CRP as low as possible.
- Try to include more low-glycaemic index foods in your diet, as they have a smaller effect on insulin and blood sugar. Namely, a high level of insulin may provoke inflammation. Instead of cookies, white bread and puffed rice cereals, include raw nuts, natural muesli and full-grain products in your menu.
- Make sure that you consume enough magnesium. Studies have proven that magnesium blood levels are inversely associated with CRP levels. Foods rich in magnesium are avocado, black beans, brown rice, pumpkins, spinach and whole-grain bread.
- Make sure to be regularly physically active. Exercise leads to a modest reduction in inflammation and decreases CRP.
- Choose walnuts for a snack between meals and regularly include fish in the main meal. Those foods are rich in omega-3 fatty acids, widely known to have various benefits on heart health – reduction of CRP level is just one of them.

Measuring our CRP helps doctors to distinguish between viral and bacterial infections. A viral infection usually has little effect on CRP blood level and concentrations from 10–60 mg/L are expected, while in the case of bacterial infections, expected CRP level is higher than 100mg/l. The reason for this is that our body fights against viral and bacterial infections in a different way. Viruses are recognised by so-called natural killer cells which kill infected cells while in the case of bacteria, our body activates neutrophils and macrophages; chemicals secreted by activated macrophages induce inflammation and speed up production of CRP.



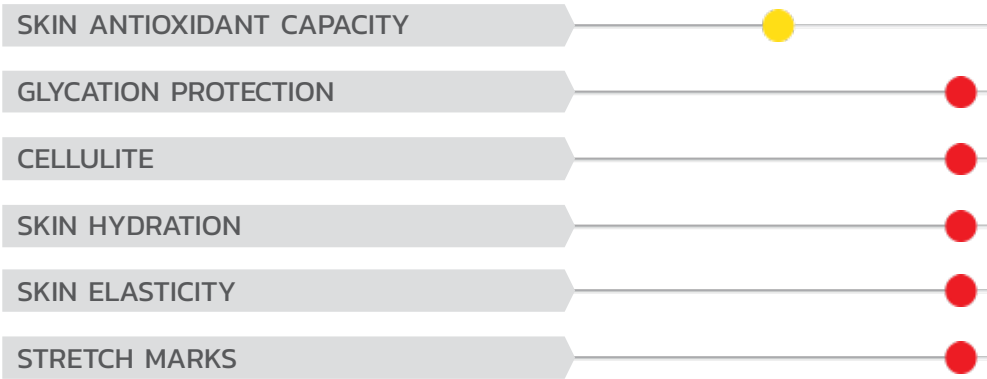


SKIN REJUVENATION

The skin is the largest organ in your body. It acts as a barrier, isolating you from the environment, protecting your body and contributing to keeping its structures intact, while also acting as a system for communicating with the environment. Because the skin is the outermost organ in direct contact with the environment, it is also the area in which the ageing processes are most clearly seen.

Skin changes are complex processes influenced by heritable and environmental factors. Recent studies have shown that up to 60 percent of skin ageing may be attributed to genetic factors. In this report you will learn more about your skin, about its antioxidant capability, elasticity, benefits related to structural collagen and the skin’s hydration capacity. These are the properties that play a key role in the health of your skin.

Although our skin appearance is largely related to genetic factors, environmental factors and nutrition also contribute to it. UV radiation, pollution, changes in temperature, smoking, and suffering stressful situations can largely accelerate the ageing process of your skin. Therefore, the overall knowledge of the genetic and environmental factors that influence the condition of your skin will help you to take care of lifestyle habits and treatments to maintain or enhance a healthy and youthful appearance.



SKIN ANTIOXIDANT CAPACITY

Proper **antioxidant protection** is of great importance for our health as our body is continually exposed to environmental pollutants and other agents, all of them capable of inducing harmful free radicals in our cells. Free radicals can be naturally produced during some metabolic processes, and can also be induced by different environmental pollutants, too extensive UV exposure, poor nutrition, alcohol consumption and smoking.

To neutralise the harmful effects of free radicals, our body possesses appropriate defence mechanisms. These antioxidant protection mechanisms help to protect our cells against free radicals by cascades of chemical reactions, all this to neutralise or at least to reduce their negative impact. Efficient antioxidant protection helps us to reduce the formation of wrinkles and preserve healthy and youthful-looking skin. If antioxidant protection is weakened, collagen (important for structural support to the skin) degrades, which can further cause progressive damage of cellular structures and premature skin ageing.

NQO1, SOD2, CAT and GPX1 are key enzymes responsible for antioxidant protection. Genetic variations in all the genes encoding these enzymes have been associated with an increased risk of oxidative stress or a reduction in antioxidant response, which increases the ageing of the skin.



YOUR RESULT: **SLIGHTLY LESS EFFICIENT ANTIOXIDANT PROTECTION**

The analysis of your DNA has shown that the antioxidant protection of your skin is slightly less efficiency.

Recommendations:

- Vitamin C, vitamin E, coenzyme Q10, resveratrol, green tea, and coffee berry polyphenols have all shown efficiency as antioxidants and free radical scavengers for skin protection.
- Acerola can provide the highest amount of vitamin C. Vitamin C is also found in red pepper, cabbage, rosehip and citruses (oranges, grapefruit and lemons).
- We recommend eating foods which contain plenty of coenzyme Q10, as it is one of the most important antioxidants. Our body produces it, but its production gradually diminishes with age. Food sources include meat (beef, chicken), fatty fish (mackerel, sardines), spinach, broccoli, cauliflower, and nuts. Coenzyme Q10 can be also found in the form of oral supplements and topical preparations.
- We recommend eating foods rich in flavonoids, which are also among important antioxidants. They are found in green tea, citruses, wine and dark chocolate.
- Micronutrients lycopene (found in tomatoes), omega-3 fatty acids (found in fish oil) and isoflavones (found in soy) are also active compounds that help enhance skin antioxidant protection.
- Avoid deep-fat frying at high temperatures, especially with unsaturated oils. Better alternatives include braising, simmering, and sautéing, using olive or coconut oils instead of regular seed oils.

To preserve the antioxidants in fruits and vegetables, keep them in a cool and dry place. That helps to slow down the breakdown of antioxidants, which otherwise naturally occur by different enzymes. Fruits and vegetables should not be trimmed or cut until they are ready to be consumed to prevent unnecessary exposure to oxygen. It is also wise to remember that the skin of some fruits and vegetables contains a higher antioxidant content than the inner parts, such as the skin of an apple or a grape.

GLYCATION PROTECTION

Glycation is a process during which excess glucose molecules bind to the collagen and elastin fibres. Together with its end products (glycation end products (AGEs)), glycation represents one of the main threats to our skin. It negatively affects skin's structural integrity and it's the leading cause of skin ageing. Glycated skin fibres become less elastic and have reduced the ability to self-repair. This can lead to dry skin, skin laxity and can cause the formation of wrinkles.

Our cells are protected against AGEs by the glyoxalase 1 enzyme, which converts AGEs into less toxic molecules. A mutation within the **GLO1 gene**, which encodes for the glyoxalase 1 enzyme can cause the enzyme to be less effective. Proper nutrition is therefore the key to healthy skin for such individuals.



YOUR RESULT:

LESS EFFICIENT PROTECTION

The analysis of your DNA has revealed that your GLO1 gene encodes for a less active glyoxalase 1 enzyme.

Recommendations:

- Your GLO1 gene encodes for less efficient protection against skin glycation.
- Try to limit your intake of products that are high in sugar and fructose corn syrup. These are popular ingredients in soda, fruit-flavoured drinks, packaged bread and crackers. When buying foods, read the labels and check the sugar content.
- When preparing your meal, we recommend you use spices and herbs such as ginger, cinnamon, cloves, rosemary, nutmeg, turmeric and ginseng. These are known to inhibit glycation because of high phenols content.
- Vitamins A, C and E can help to replenish collagen levels and, in this way, slow the ageing process. We recommend that you use the nutrition charts and select those food items which are rich in these vitamins.

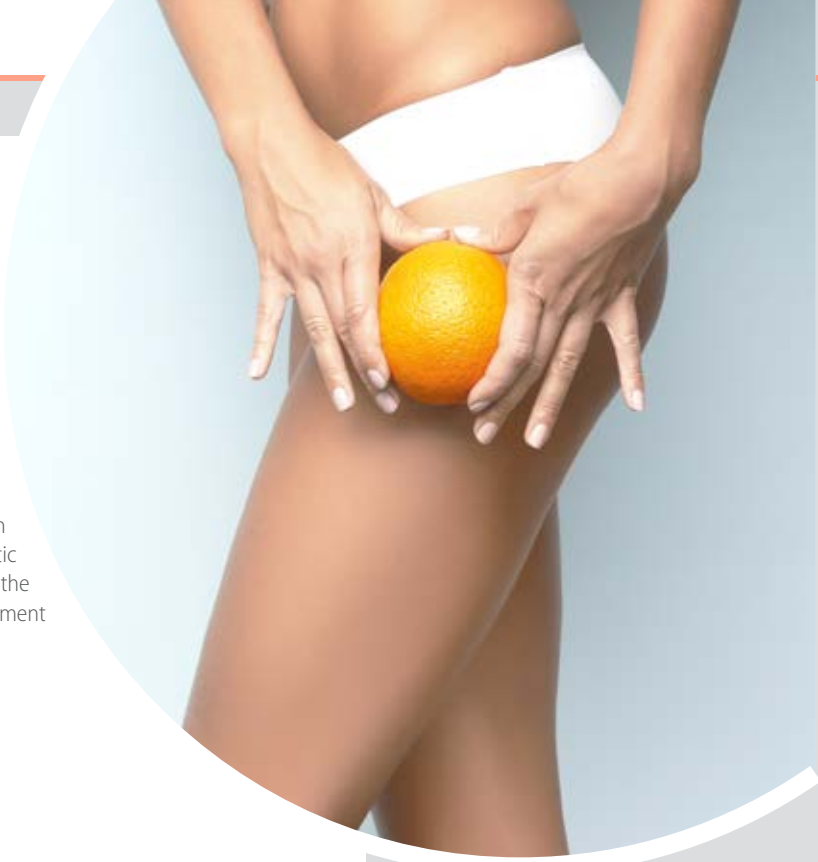


The cross-links formed between sugar and protein molecules emit a fluorescence. If you take a fluorescent image of young people, their skin will come out very dark, but with getting older the AGEs will accumulate and the brightness will increase.

CELLULITE

Cellulite is a term for the typical accumulation of subcutaneous fat that results in a dimpled, lumpy appearance of the skin and is often called "orange peel skin". Usually, cellulite appears in the area of the thighs, hips and buttocks. Cellulite does not affect your health. However, it's in our nature to prefer smooth skin.

On average, cellulite is present in 90% of women and 10% of men and is more common in Caucasians compared to Asians. The development of cellulite depends on many factors including hormonal changes, gender, ethnicity, age, excessive weight, poor diet, lack of physical activity, dehydration and our genetics. Studies identified the genes ACE and HIF1A as major genetic contributors in cellulite development. Scientists proved that carriers of the mutation within the gene HIF1A have a 50% lower risk of cellulite development before the age of 30 compared to individuals without this mutation.



YOUR RESULT:

INCREASED RISK

Based on your genetics, your risk of development cellulite is considered increased.

Recommendations:

- Even if your genes determine that your risk of development of cellulite is increased, do not worry too much – a lot still depends on your lifestyle.
- To minimise the likelihood of cellulite appearance, we recommend you follow a diverse, healthy diet.
- Avoid foods with high sugar content. Such foods contribute to the expansion of fat cells and also contribute to cellulite development.
- Ensure you drink enough water. The more you hydrate your body, the better your blood circulation will be, which in turn means a smaller chance of your skin losing elasticity due to dehydration.
- Exercise regularly! Physical activity will increase your blood flow and thus enhance the ability of your body to release fat deposits and use them as an energy source. With regular exercise, you will also strengthen your muscles, which will reduce cellulite appearance if you already have some.
- Beauty salons offer different techniques such as massage or laser treatment to get rid of cellulite. The truth is that you cannot really get rid of it; however, after several sessions, those techniques significantly reduce cellulite appearance. Unfortunately, the effect is short-term and maintenance treatment should be performed monthly to keep that appearance.

Even movie stars have cellulite! It is true that most of us perhaps prefer to have smooth skin, but if you have some cellulite you are definitely not alone and most importantly—it does not affect your health.

SKIN HYDRATION

Skin is a protective barrier which needs to be sufficiently hydrated. Hydration is essential to ensure skin elasticity and proper functioning, especially the skin's outer layer, called stratum corneum, which contains 10–20 percent water. Dry, dehydrated skin can lose its soft, flexible characteristics and may crack or even bleed, which can lead to the increased risk of infection. Dehydrated skin also contributes to the development of visible wrinkles.

Loss of water from the skin must be therefore carefully regulated. Aquaporin-3 (AQP3) is a protein, encoded by the AQP3 gene, that forms pores in the membrane of skin cells through which water can be transported more rapidly inside the cell. AQP3 regulates the movement of water and glycerol molecules across cell membranes, while preventing the passage of ions and other solutes. AQP3 is therefore an essential hydration-regulating element of our skin and is fundamental in general skin hydration, skin elasticity, wound healing and epidermal biosynthesis.



YOUR RESULT:

DECREASED HYDRATION ABILITY

The genetic analysis has revealed that you are a carrier of two unfavourable copies of AQP3 gene. That indicates reduced (natural) hydration ability of your skin.

Recommendations:

- Your genetic makeup determines that you have, compared to people with one or two favourable copies of AQP3 gene, reduced hydration ability and you are therefore more susceptible to dry skin.
- However, you can do a lot to make your skin hydrated, by actively following our recommendations.
- Use moisturisers and night creams regularly. They should include ingredients in one of three different classes to help promote skin hydration: humectant, emollients, and occlusive.
- One of the best humectants is hyaluronic acid. It holds water molecules on the surface of your skin to keep hydrated.
- You can also prepare a facial mask on a basis of honey. Honey is a humectant, which helps your skin to absorb moisture.
- Try to add moisturisers like jojoba oil or rosehip seed oil into your regular cream.
- Do not use soap and water to wash your face. Soap is naturally alkaline therefore it alters your skin's acidity and makes skin dry.
- Try to avoid lotions or creams that include perfumes.
- Your diet has also a significant impact on your skin's health. Lack of micronutrients leads to lack of moisture. Eating salmon, avocado, papaya, olive oil and nuts will help you to hydrate and rejuvenate dry skin.

Do you enjoy taking long hot showers? As pleasant as that can be, the heat from hot water combined with soap softens your skin and slowly strips away its natural, oily protective barrier. That can lead to a feeling of dryness and itchiness. The longer and hotter the shower is, the more moisture you can lose.

SKIN ELASTICITY

Elasticity is the skin's ability to stretch and revert to its original shape without developing wrinkles and other imperfections. This ability depends on collagen, a protein responsible for the strength and firmness of connective tissues. Collagen is also well known for its role in maintaining flexible, firm and youthful-looking skin.

Your body constantly produces and degrades collagen. When we are young, our body produces more collagen than it loses. With age, collagen degradation speeds up. Overexposure to UV rays, smoking, constant stress and an unhealthy diet are the main lifestyle factors that cause collagen degradation and affect skin elasticity. However, skin elasticity also greatly depends on our genes. Two of the most important genes in skin ageing processes are **MMP1** and **STXBP4L**. The MMP1 gene encodes for the enzyme that breaks down collagen. The MMP-1 enzyme can be also induced by exposure to sunlight and production increases as a function of age.



YOUR RESULT: **HIGHER RISK FOR LOSING SKIN ELASTICITY**

Genetic test shows that you are more likely to lose your skin elasticity earlier than the average person.

Recommendations:

- Individuals with your genetic makeup experience increased skin sensitivity.
- However, you need to know that genes only determine your predispositions. There are many environmental factors which influence collagen production and degradation and consequently there are many ways to positively influence your skin elasticity.
- For instance, smoking is one of the major environmental contributors for prematurely losing of skin elasticity. Try to avoid smoking, even passive smoking.
- Although exposure to natural sunlight is healthy for maintaining vitamin D levels and also for collagen production, avoid tanning booths as they use intense UV-A light which causes rapid damage to skin. Use sun protection during the peak hours when the sun is the hottest and most damaging to your skin.
- With its antioxidant effect vitamin A helps to block free radicals – agents that increase the risk of premature ageing.
- Vitamin A also can help to build up collagen fibre within the skin, restore elasticity and thus, efficiently smooth wrinkles.
- Include food rich in vitamin A in your diet. Sweet potatoes, carrots, spinach, pumpkins, tomatoes and beef liver are some good examples.
- In addition, you may also consume food rich in collagen, like bone broth. If you don't like it, you can take collagen as a supplement instead.

Collagen, the protein which keeps your skin firm, plump and wrinkle-free, represents up to 75 percent of your skin and is the most abundant protein in the body.

STRETCH MARKS

Stretch marks typically appear as bands of parallel lines on our skin. The lines are usually purple or bright pink and have a different texture from your normal skin. They most commonly appear in the area of the stomach, breasts, thighs, buttocks and upper arms. Stretch marks often fade over time and become less visible, however once they are formed, they never completely disappear.

Stretch marks are present in more than 50% of women and more than 20% of men. They are usually formed during excessive skin distension. They can occur as a consequence of rapid weight gain or bodybuilding (especially in combination with steroids), during pregnancy, due to rapid growth (teenagers) or deployment of certain parts of the body. Scientific studies have shown that some individuals are more susceptible to formation of stretch marks than others due to their genetic background.



YOUR RESULT:

INCREASED RISK FOR STRETCH MARKS

Based on your genetics, your risk of the appearance of stretch marks is increased.

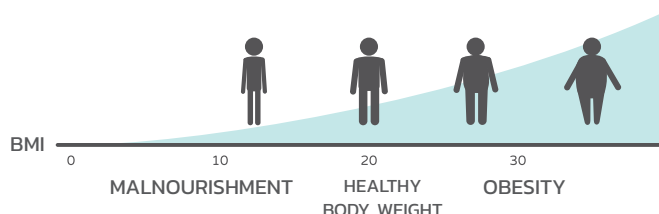
Recommendations:

- Your genetic makeup defines higher likelihood of developing stretch marks. Therefore, we recommend you pay attention to lifestyle factors which may help you to decrease the overall risk and prevent their appearance.
- The most you can do is to maintain a healthy weight, since rapid weight gain is one of the major causes of the formation of stretch marks.
- If you want to lose some weight, avoid restrictive weight-loss diets as rapid weight loss may also cause the appearance of stretch marks.
- Foods rich in vitamin C are good for your skin. Vitamin C is an important nutrient in collagen formation. Collagen keeps your skin elastic and strong, reduces the appearance of wrinkles and may also prevent the formation of stretch marks.
- If you get some stretch marks, you can use creams that contain retinoid. Those creams may help fade stretch marks. Be careful to follow the instructions for the use of certain creams, since applying too much of it can cause your skin to become red, irritated, or scaly.

According to the latest research, more than 75 percent of women develop stretch marks during pregnancy. It is due to the excessive skin distension in the abdominal area, which occurs when the baby is growing and needs more space. Using creams and other products which boost collagen production and increase skin elasticity may slightly decrease the risk of formation of stretch marks during pregnancy.

MORE ON EXCESS WEIGHT AND BODY MASS INDEX

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



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

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

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



MORE ON ANALYSES

MORE ON VITAMINS

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

WATER-SOLUBLE VITAMINS **B | C**

FAT-SOLUBLE VITAMINS **A | D | E | K**

MORE ON MINERALS

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



MORE ON CHOLESTEROL AND FAT METABOLISM

Cholesterol is a white-yellowish substance similar to fats. Triglycerides are molecules, built of three fatty acids bound on glycerol. All foods of animal origin contain cholesterol, while there is no cholesterol in foods of plant origin. It is the basic constituent of all the cells in our body, and sexual and adrenal hormones are formed from it, as well as vitamin D and gall acids. Since we usually do not have problems with the lack of it, a lower cholesterol level is generally more favourable. A desired general cholesterol level is less than 5 mmol/L, but even more important is the ratio between the bad LDL and the good HDL cholesterol, which should not be lower than 4:1, or for genetically and environmentally more challenged people, 3:1. It is true that 80 percent of cholesterol is produced by the body, while the cholesterol from food represents 20 percent of the entire amount of cholesterol. In healthy people, with the intake of cholesterol with food, its production in the body usually decreases. In people with an unfavourable genetic makeup, this regulation is not optimal, and it can cause an increase of LDL cholesterol as well as the level of triglycerides.

The cholesterol and triglyceride metabolism is quite complicated. They are water-insoluble molecules, and, after ingestion, they bind with substances, called lipoproteins, in the intestinal villi, in order to enter the bloodstream. In the meantime, cholesterol, which is produced by the body in the liver, binds with particles, known as VLDL, and also enters the bloodstream. From the VLDL complexes, free fatty acids start to detach and enter fat cells where they are transformed back into triglycerides. This way, we get particles, known as IDL, which further lose triglycerides and we get LDL. In everyday life, we normally mention only LDL and HDL. LDL particles contain few triglycerides and are rich in esterified cholesterol (cholesterol bound with fatty acids) and they represent a huge container of cholesterol for the synthesis of steroids, membranes and gall acids. LDL particles transport up to two-thirds of cholesterol, known also as harmful cholesterol, around the body, even though it is not necessary for the optimal functioning of the body. They transport it from the liver to other parts of the body. HDL particles, however, do just the opposite. They transport the cholesterol in the opposite direction; they eliminate it from the bloodstream and return it to the liver, where a greater part of it is excreted in the form of gall acids. The majority of it is again absorbed into the liver and then into the blood. This process is called "enterohepatic circulation". HDL, therefore, protects the cells of the vascular wall, inhibits the oxidation of LDL cholesterol and prevents clumping of blood platelets – thrombocytes, which accumulate at the site of a damaged vascular wall. Because of this function, it has acquired names such as good, beneficial and protective cholesterol. If the LDL cholesterol concentration overly increases or the HDL cholesterol concentration overly decreases, we risk cardiovascular and coronary disease, such as angina pectoris, heart attack, brain stroke, leg artery disease, etc. The problem is also the oxidation of LDL cholesterol which is encouraged by bad habits, which can lead to cardiovascular disease. Hence it is crucial for our health to pay attention to our diet, exercise and does not succumb to bad habits such as alcohol drinking and smoking.

MORE ON OMEGA-3 FATTY ACIDS

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



MORE ON BLOOD SUGAR

Carbohydrates are part of a large group of molecules, which represent the main energy source for our organism. After consumption, our body breaks down complex carbohydrates or tries to break them down into the simplest ones, the monosaccharides. Our body turns most of the sugars into glucose, and our cells can use them as a basic source of energy. Only then are the molecules small enough to enter our bloodstream. An exception is fibres, which are built in such a way that our body cannot break them down to monosaccharides, and they, therefore, pass the intestinal tract intact. However, it is generally true, that our body breaks down consumed carbohydrates into glucose, which then enters the bloodstream. The result is the increase in blood sugar, and special cells start to secrete insulin. This is a sign that cells have to accept sugar from the blood, and that blood sugar supplies have to stop entering the bloodstream. Slowly, the blood sugar level drops to its initial level. An adequate regulation ensures that the blood sugar level does not increase too much, and that it quickly drops to the basic level, and that it is always available. In some people, this regulation is not adequate. In countless research, scientists have discovered that, due to mutations in the genetic makeup, two types of abnormalities occur:

- The body does not produce enough insulin, and the blood sugar level drops to an appropriate level more slowly.
- Cells are less sensitive to insulin, and liver cells, therefore, despite the fact that glucose and insulin concentration increases sufficiently, does not cease to secrete glucose supplies.

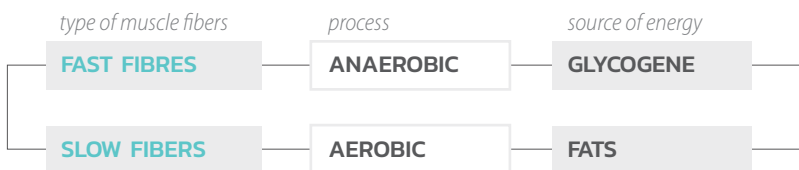
All this can lead to a permanently increased blood sugar level and, consequently, to diabetes. This risk can effectively be reduced with an appropriate diet and lifestyle.

An exception is the metabolism of a monosaccharide fructose, which is carried out differently. Fructose, as opposed to glucose, does not influence the increase of blood sugar level, because it does not need insulin for its metabolism – this is why, in small amounts, it is allowed also for diabetics. However, exaggerating with fructose is far from healthy, because its metabolism is similar to that of fats. Nowadays, in America, fructose is one of the main reasons for increased LDL cholesterol and triglyceride levels, as well as a decreased HDL cholesterol level and unresponsiveness to insulin. The majority of fructose is consumed as an added sweetener to various food products, and it is, therefore, wise to read food labels (where possible) and choose foods without added sugars.



MORE ON MUSCLE STRUCTURE

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



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

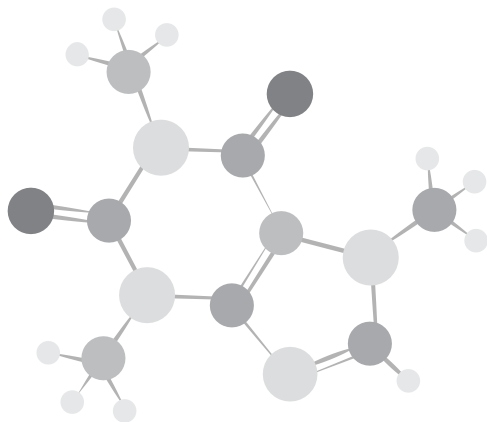
PPAR alpha is also a known gene, for which scientists have claimed that it is more active in slow muscle fibres, which is logical, considering its function. Namely, PPAR alpha regulates the activity of genes, responsible for the oxidation of fats. Endurance training actually increases the consumption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



MORE ON CAFFEINE

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

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



A WAY TO YOUR IDEAL BODY WEIGHT

Gene	Analysis	Role of the gene	Genotype
ADIPOQ	Weight loss-regain	A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.	GG
INSIG2	Risk for being overweight	A protein found in the endoplasmic reticulum of the cells and blocks the processing of the protein SREB in order to regulate the synthesis of cholesterol.	CG
MC4R	Risk for being overweight	A receptor involved in many physiological processes, such as regulation of energy consumption/storage in the body, the formation of steroids and control of temperature.	TT
TNFA	Risk for being overweight	A cytokine, which is secreted by macrophages. It has an important role in the immune response to infections.	GG
PCSK1	Risk for being overweight	An enzyme which processes proinsulin type I, and, therefore, has an important role in regulating the biosynthesis of insulin.	AA
NRXN3	Risk for being overweight	A protein from the family of neuexins, which function as adhesive molecules and receptors in the nervous system.	AA
FTO	Risk for being overweight	A gene that determines the development of excess body weight.	AT
TMEM18	Risk for being overweight	A highly conserved protein, which is predominantly expressed in brains.	CT
GNPDA2	Risk for being overweight	A gene involved in the development of excess body weight.	GG
BDNF	Risk for being overweight	A protein from the family of nerve growth factors. It is involved in the survival and differentiation of certain neurons.	AG
APOA2	Risk for being overweight	A protein, which is the second most represented component of HDL particles. It has an important role in the HDL metabolism.	CT
APOA2	Response to saturated fats	A protein, which is the second most represented component of HDL particles. It has an important role in the HDL metabolism.	CT
ADIPOQ	Response to monounsaturated fats	A gene expressed in the fatty tissue. It regulates fat metabolism and sensitivity to insulin.	GG
PPAR alpha(1)	Response to polyunsaturated fats	Regulator of the synthesis of fatty acids, the oxidation, gluconeogenesis and ketogenesis.	CC
FTO	Response to carbohydrates	A gene involved in the development of excess body weight.	AT
KCTD10	Response to carbohydrates	The gene encodes the domain of the potassium channel, responsible for its selective transport through the cell membrane.	GG

WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

Gene	Analysis	Role of the gene	Genotype
ALPL	Vitamin B6	Enzyme which functions in an alkaline environment and is crucial for growth and development of bones and teeth, as it is involved in the process of mineralisation, which is the process of accumulation of calcium and phosphorus. It also influences the level of vitamin B6.	CC
MTHFR	Vitamin B9	Reduces 5,10-methylene-tetra-hydro-folate into methyl-tetra-hydro-folate and is, therefore, important for absorption of vitamin B9.	CT
FUT2	Vitamin B12	Protein, which influences the level of vitamin B12.	AA
GC	Vitamin D	Binding and transport of vitamin D and its metabolites through the body, and influencing the vitamin D level.	AC
DHCR7	Vitamin D	7-dehydrocholesterol transforms vitamin D3, which is the precursor of 25-hydroxivitamin D3, into cholesterol, and in this way eliminates the substrate from the synthetic pathway.	GT
CYP2R1	Vitamin D	Transforms vitamin D into an active form, so that it can bind with the receptor for vitamin D.	AG
TMPRSS6	Iron	Enzyme which is found on the cell surface and is involved in the uptake and recycling of iron.	GG
HFE	Iron	Enzyme which is found on the cell surface. It detects the amount of iron in the body and regulates the production of protein hepcidin, which is the main iron-regulating hormone in the body.	GG
AGT	Sodium (salt)	Gene is expressed in the liver. It activates with low pressure through renin and angiotensin converting enzyme (ACE), where angiotensin II is formed. It is in charge of the maintenance of blood pressure and electrolyte homeostasis.	TT
CLCNKA	Sodium (salt)	Chloride channel with 12 transmembrane domains, which is in charge of the maintenance of blood pressure.	AG
WNK1	Potassium	Protein, which is responsible for the transport of sodium and potassium. It is included in electrolyte homeostasis and regulation of blood pressure.	AA
COL1A1	Bone density	Collagen type I built from two alpha 1 chains and one alpha 2 chain. Collagen is the main protein of the organic part of the bone matrix (98%).	GT
GPR177	Bone density	Protein is part of the evolutionary highly conserved Wnt signal pathway, which is important for the differentiation and development of bone cells, and the resorption of bone material.	AG
DCDC5	Bone density	A highly conserved element, which serves as a template for protein links.	AG
ZBTB40(1)	Bone density	Protein, found in the bone tissue and influences bone density.	AA
ZBTB40(2)	Bone density	Protein, found in the bone tissue and influences bone density.	GG

WHICH VITAMINS AND MINERALS DOES YOUR BODY NEED?

Gene	Analysis	Role of the gene	Genotype
ESR1	Bone density	A transcription factor involved in the regulation of the expression of genes, which influences the proliferation of cells and differentiation of tissues. It is responsible for growth and maintenance of the strength of human bones.	AG
C6ORF97	Bone density	Protein, which influences bone density.	TT
SP7	Bone density	Transcription factor and the activator of bone cell differentiation.	AG
AKAP11	Bone density	Member of a structurally completely different group of proteins, which have a common function of binding the regulatory subunit of kinase A. It is highly expressed during spermatogenesis. It is found next to gene RANKL, which has an important role in bone metabolism.	CC
TNFRSF11A	Bone density	It is essential for RANKL-regulated osteoclastogenesis – the formation of osteoclasts (cells which break down bone cells).	TT
CA1	Zinc	A gene that encodes a zinc-containing enzyme which catalyses the formation and dissociation of carbonic acid from carbon dioxide and water and plays an important role in carbon dioxide transport.	CC
PPCDC	Zinc	A gene that encodes enzyme PPCDC and affects zinc status through effects on vitamin B5 (pantothenate) metabolism.	TT
NBDY	Zinc	A gene that promotes dispersal of P-body components and is likely to play a role in the mRNA decapping process.	TT

IMPORTANT INFLUENCES ON YOUR EATING HABITS

Gene	Analysis	Role of the gene	Genotype
ADRA2A	Sweet treats intake	Regulates the transmission of the nervous impulse and influences our behavioural habits.	CC
NMB	Hunger	Involved in the regulation of feeding processes.	AC
FTO	Satiety	Protein, involved in the development of excess body weight.	AT
SLC2A2	Perception of sweet taste	Regulates glucose transport and is a glucose sensor.	CT
TAS2R38	Perception of bitter taste	A transmembrane receptor, which determines the ability to detect bitter substances, found in the plant genus Brassica.	CG

THE EFFECTIVENESS OF YOUR METABOLISM

Gene	Analysis	Role of the gene	Genotype
ALDH2	Alcohol metabolism	The enzyme involved in the metabolic pathways of the breakdown of alcohol. It is responsible for an adequate alcohol metabolism.	GG
ADH1B	Alcohol metabolism	The enzyme involved in the metabolism of countless substrates, such as ethanol, retinol, aliphatic alcohols, hydroxysteroid, and products of peroxidation. Its activity, therefore, determines an adequate alcohol metabolism.	TT
ADH1C_1	Alcohol metabolism	The enzyme involved in the metabolism of countless substrates, such as ethanol, retinol, aliphatic alcohols, hydroxysteroid, and products of peroxidation. Its activity, therefore, determines an adequate alcohol metabolism.	GG
ADH1C_2	Alcohol metabolism	The enzyme involved in the metabolism of countless substrates, such as ethanol, retinol, aliphatic alcohols, hydroxysteroid, and products of peroxidation. Its activity, therefore, determines an adequate alcohol metabolism.	CT
CYP1A2	Caffeine metabolism	The enzyme responsible for the breakdown of caffeine, aflatoxin B1 and acetaminophen. It is involved in the synthesis of cholesterol and other lipids.	AA
MCM6	Lactose intolerance	Gene that regulates the concentration of the enzyme lactase.	CT
DQA1	Gluten intolerance	This gene belongs to the HLA class II beta chain paralogs. It plays a central role in the immune system by presenting peptides derived from extracellular proteins.	GG
DQB1	Gluten intolerance	This gene belongs to the HLA class II beta chain paralogs. It plays a central role in the immune system by presenting peptides derived from extracellular proteins.	TT

LIFESTYLE HABITS

Gene	Analysis	Role of the gene	Genotype
CHRNA3	Nicotine addiction	It is a subunit of a nicotine receptor. Nicotine receptors are ion channels in the membranes of nerve cells, which regulate the potential of neuron cell membranes. They are the receptors for the nervous transmitter acetylcholine.	GG
DRD2	Alcohol addiction	The receptor that inhibits the activity of adenylyl cyclase. It is involved in the processes of movement, cognition (memorisation) and learning.	CT
ERAP1	Alcohol addiction	Aminopeptidase, which has an important role in the metabolism of various types of peptides. One of such peptides is angiotensin II, through which it regulates blood pressure.	AG
GABRA	Alcohol addiction	Receptor, which regulates signal transmission through the synapse in the central nervous system. It is the subunit of the chloride channel and has sites for bonding benzodiazepines, barbiturates, neurosteroids, and ethanol.	AG
TERC	Biological ageing	A telomerase, whose main component is TERC, is a polymerase, which maintains the length of telomeres (chromosome endings) by adding telomere repeat TTAGGG.	CC
IL6	Inflammation sensitivity	Interleukine-6 pro-inflammatory molecule (IL6) stimulates the immune response to training and is involved in the inflammatory repair process. It plays a role in glucose and lipid metabolism.	GG
TNF	Inflammation sensitivity	Pro-inflammatory molecule. Elevated levels of TNF are associated with in an increase in the systemic immune response and inflammatory processes.	GG

LIFESTYLE HABITS

Gene	Analysis	Role of the gene	Genotype
CRP	Inflammation sensitivity	C-Reactive Protein is involved in several host defense related functions. Consequently, the level of this protein in plasma increases greatly during acute phase response to infection or other inflammatory stimuli. It is often used as a marker for inflammation in blood tests.	CT
IL6R	Inflammation sensitivity	IL6R gene encodes a subunit of the interleukin 6 (IL6) receptor complex. Interleukin 6 is a potent pleiotropic cytokine that regulates cell growth and differentiation and plays an important role in the immune response and inflammation.	AA
CLOCK	Sleep cycle	A gene encoding a basic helix-loop-helix-PAS transcription factor (CLOCK) that affects both the persistence and period of circadian rhythms.	CT
NPAS	Sleep cycle	A gene that functions as a part of a molecular clock operative in the mammalian forebrain.	AG

YOUR GENES, DETOXIFICATION AND ANTIOXIDANTS

Gene	Analysis	Role of the gene	Genotype
CAT	Oxidative stress	Catalase transforms reactive oxygen species into water and oxygen, and, therefore, reduces the toxic influence of hydrogen peroxide	GG
NQO1	Oxidative stress	Enzyme which functions as quinone reductase in connection to the conjugation of hydroquinones. It is involved in numerous detoxification pathways and biosynthetic processes, such as vitamin K-dependent glutamate carboxylation.	CC
APOA5	Vitamin E	Apolipoprotein A5 has an important role in the regulation of the level of chylomicrons and triglycerides in the plasma. Because vitamin E is fat-soluble, APOA5 through lipid concentration in the blood affects the vitamin E level.	CC
SEPP-1_1	Selenium	Functions as an antioxidant. It is responsible for selenium transport, mostly to the brain and the testicles.	GG
SEPP-1_2	Selenium	Functions as an antioxidant. It is responsible for selenium transport, mostly to the brain and the testicles.	GG
SLC23A1	Vitamin C	One of the two transporters, responsible for the distribution of dietary vitamin C in our body. A variant of this gene causes reduced absorption of vitamin C and is associated with lower plasma vitamin C concentrations.	CC

SPORTS AND RECREATION IN TUNE WITH YOUR GENES

Gene	Analysis	Role of the gene	Genotype
ACTN3	Muscle structure	Protein, expressed in the muscles. It binds to actin, and is, therefore, important for muscle contraction.	CT
PPAR alpha(2)	Muscle structure	Regulates the expression of genes, responsible for the oxidation fatty acids in the skeletal muscles and the heart muscle.	GG

SPORTS AND RECREATION IN TUNE WITH YOUR GENES

Gene	Analysis	Role of the gene	Genotype
INSIG2	Strength training	<i>Protein is present in the endoplasmic reticulum, where it regulates the processing of binding protein for the sterol regulatory element.</i>	CG
ADRB2	VO2max	<i>β2 adrenergic receptor (ADRB2) is a member of the G-protein-coupled receptor superfamily and plays a pivotal role in the regulation of the cardiac, pulmonary, vascular, endocrine, and central nervous system.</i>	GG
PPARGC1A	VO2max	<i>PPARGC1A is a transcriptional coactivator of PPAR family and is involved in mitochondrial biogenesis, fatty acid oxidation, glucose utilization, thermogenesis and angiogenesis.</i>	CC
VEGFA	VO2max	<i>A variant in the VEGFA gene has been associated with VEGF protein expression. Several studies revealed associations of VEGFA gene polymorphisms with aerobic capacity in humans and endurance athlete status.</i>	TT
ACE	VO2max	<i>ACE exerts a tonic regulatory function on circulatory homeostasis, through the synthesis of vasoconstrictor angiotensin II, which also drives aldosterone synthesis and the degradation of vasodilator kinins.</i>	CG
PPAR alpha_2	VO2max	<i>Peroxisome proliferator-activated receptor alpha (PPAR alpha) gene is implicated in the hypoxia-inducible factor (HIF) oxygen signalling pathway and regulation of erythropoiesis.</i>	GG
CAT	Post-exercise recovery	<i>Catalase breaks down hydrogen peroxide (H2O2), which production is elevated during high intensity training. At low levels, it is involved in several chemical signalling pathways, but at high levels it is toxic to cells.</i>	GG
NQO1	Post-exercise recovery	<i>The enzyme which functions as a quinone reductase in connection to the conjugation of hydroquinones. It is involved in numerous detoxification pathways and biosynthetic processes, such as vitamin K-dependent glutamate carboxylation.</i>	CC
GPX1	Post-exercise recovery	<i>Glutathione peroxidase functions in the detoxification of hydrogen peroxide and is one of the most important antioxidant enzymes in humans.</i>	CC
SOD2	Post-exercise recovery	<i>This gene is associated with the synthesis of superoxide dismutase, an enzyme found to be associated with the conversion of superoxide (O2-) into oxygen (O2) and hydrogen peroxide (H2O2). Superoxide dismutase is an important antioxidant which protects the cell from ionising radiation, oxidative stress and inflammatory cytokines.</i>	CT
IL6	Inflammation	<i>Interleukine-6 pro-inflammatory molecule (IL6) stimulates the immune response to training and is involved in the inflammatory repair process. It plays a role in glucose and lipid metabolism.</i>	GG
TNF	Inflammation	<i>Pro-inflammatory molecule. Elevated levels of TNF are associated with an increase in the systemic immune response and inflammatory processes.</i>	GG
CRP	Inflammation	<i>C-Reactive Protein is involved in several host defense related functions. Consequently, the level of this protein in plasma increases greatly during acute phase response to infection or other inflammatory stimuli. It is often used as a marker for inflammation in blood tests.</i>	CT
IL6R	Inflammation	<i>IL6R gene encodes a subunit of the interleukin 6 (IL6) receptor complex. Interleukin 6 is a potent pleiotropic cytokine that regulates cell growth and differentiation and plays an important role in the immune response and inflammation.</i>	AA
MMP3	Soft tissue injury risk	<i>It codes for the enzyme, called Matrix Metalloproteinase 3, which is responsible for the breakdown of fibronectin, collagen and proteoglycans of the cartilage. As such, it is involved in wound repair and progression of atherosclerosis.</i>	AG

SPORTS AND RECREATION IN TUNE WITH YOUR GENES

Gene	Analysis	Role of the gene	Genotype
COL5A1	Soft tissue injury risk	<i>It has been shown the variant within COL5A1 gene affects our (in)flexibility (passive straight leg and a sit-and-reach measurement), which consequently affects our soft tissue injury risk.</i>	AC
COL1A1	Soft tissue injury risk	<i>COL1A1 encodes for collagen type I, a protein that strengthens and support many tissues in the body, including cartilage, bone and tendon.</i>	GT
GDF5	Soft tissue injury risk	<i>GDF5 (growth differentiation factor 5) is a member of the bone morphogenetic protein (BMP) family and the TGF-beta superfamily and can affect our soft tissue injury risk.</i>	AA
CREB1	Heart capacity	<i>CREB1 has been found to be involved in the generation of long-term cardiac memory, a process leading to adaptation of ventricular repolarization (indexed by electrocardiographic T wave) to ventricular pacing.</i>	AG
ACE	Heart capacity	<i>ACE exerts a tonic regulatory function in circulatory homeostasis, through the synthesis of vasoconstrictor angiotensin II, which also drives aldosterone synthesis, and the degradation of vasodilator kinins.</i>	CG
IL15RA	Muscle volume gene	<i>Growth factor that is expressed in muscle and has been demonstrated to have anabolic effects, with increased levels being linked to muscle growth in various studies.</i>	CC
COMT	Warrior gene	<i>COMT is one of several enzymes that degrade dopamine, epinephrine, and norepinephrine. COMT breaks down dopamine mostly in the part of the brain responsible for higher cognitive or executive function (prefrontal cortex).</i>	AG
TRHR_1	Lean body mass	<i>TRHR encodes the thyrotropin-releasing hormone (TRH) receptor. The TRH response to TRHR is the first step in the hormonal cascade that eventually leads to the release of thyroxin, which is important in the development of skeletal muscle.</i>	AC
TRHR_2	Lean body mass	<i>TRHR encodes the thyrotropin-releasing hormone (TRH) receptor. The TRH response to TRHR is the first step in the hormonal cascade that eventually leads to the release of thyroxin, which is important in the development of skeletal muscle.</i>	CT
MCT-1	Gene for fatigue	<i>A gene associated with the synthesis of MCT1, a molecule that transports lactic acid across the muscle cell membrane.</i>	AA

CARDIOVASCULAR HEALTH

Gene	Analysis	Role of the gene	Genotype
FADS1-2-3_1	HDL cholesterol, LDL cholesterol, Triglycerides	<i>The family of desaturases which incorporate double bonds into fatty acids.</i>	CT
CETP_1	HDL cholesterol, LDL cholesterol	<i>Protein, which collects triglycerides from VLDL and LDL, and replaces them with cholesterol esters from HDL and vice versa.</i>	TT
APOA1	HDL cholesterol, LDL cholesterol, Triglycerides	<i>The main lipoprotein of HDL particles.</i>	CG
ANGPTL3	LDL cholesterol, Triglycerides	<i>Protein which, through liver receptor X, influences the level of plasma lipids.</i>	TT

CARDIOVASCULAR HEALTH

Gene	Analysis	Role of the gene	Genotype
GALNT2	HDL cholesterol, Triglycerides	<i>Protein, responsible for the biosynthesis of oligosaccharides.</i>	AG
PLTP	HDL cholesterol, Triglycerides	<i>A transport protein for phospholipids, which is present in the blood plasma. It transports phospholipids from lipoproteins, rich in triglycerides on HDL.</i>	CT
MLXIPL	HDL cholesterol, Triglycerides	<i>In relation to glucose, it binds and activates motifs of carbohydrate response elements (ChoRE) and motifs, responsible for the synthesis of triglycerides.</i>	CC
TRIB1_3	HDL cholesterol, LDL cholesterol, Triglycerides	<i>Protein, involved in the regulation of inflammation in the fatty tissue, and in obesity, induced by a high-fat content diet.</i>	AA
PPARalfa_1	HDL cholesterol	<i>Regulator of the synthesis of fatty acids, the oxidation, gluconeogenesis and ketogenesis.</i>	CC
APOE_1	HDL cholesterol, LDL cholesterol	<i>Protein, essential for the breaking down of lipoproteins, rich in triglycerides.</i>	AG
APOB_1	HDL cholesterol, LDL cholesterol, Triglycerides	<i>The main lipoprotein of chylomicrons and LDL particles.</i>	AG
ABCG5/8	LDL cholesterol	<i>Proteins, which regulate the cell export of cholesterol. Incorrect functioning is expressed in the accumulation of sterols.</i>	GT
LDLR	LDL cholesterol	<i>Protein, which binds LDL particles on the surface of cells, and enables their transport into cells.</i>	GT
PPP1R3B	HDL cholesterol, LDL cholesterol	<i>Inhibits the inactivation of glycogen phosphorylase, and limits the breakdown of glycogen.</i>	AG
ABCA1	HDL cholesterol, LDL cholesterol, Triglycerides	<i>A membrane transporter, which regulates the transport of cholesterol and phospholipids, and the formation of HDL.</i>	GG
LIPC	HDL cholesterol	<i>A receptor for cholesterol, phospholipids, glycerides and acyl-CoA thioesters.</i>	AG
LCAT	HDL cholesterol	<i>It esters the cholesterol, which is crucial for the transport of cholesterol.</i>	AG
LIPG	HDL cholesterol	<i>Protein, which enables the hydrolysis of HDL particles.</i>	GG
HLA	LDL cholesterol, Triglycerides	<i>It helps to differentiate between the body's own and the foreign substances.</i>	CT
GCKR_1	LDL cholesterol, Triglycerides	<i>Inhibits the activity of glucokinase, which is an important enzyme in glucose metabolism.</i>	CT
TIMD4	LDL cholesterol, Triglycerides	<i>Phosphatidylserine receptor that enhances the engulfment of apoptotic cells.</i>	TT
IL6R	LDL cholesterol	<i>IL6R gene encodes a subunit of the interleukin 6 (IL6) receptor complex. Interleukin 6 regulates cell growth and plays an important role in the immune response.</i>	CC

CARDIOVASCULAR HEALTH

Gene	Analysis	Role of the gene	Genotype
APOA5	Triglycerides	Apolipoprotein A5 has an important role in the regulation of the level of chylomicrons and triglycerides in the plasma.	CC
LPL	HDL cholesterol, Triglycerides	Lipoprotein, which eliminates fats from chylomicrons and VLDL.	AA
LRP1	HDL cholesterol, Triglycerides	Protein, involved in cellular lipid homeostasis.	CC
IRS1	HDL cholesterol, Triglycerides	Protein which is phosphorylated by insulin receptor tyrosine kinase.	AA
TCF7L2	Blood sugar	A transcription factor which is involved in the Wingless-type (Wnt) signal path through which it influences diabetes type II.	CC
SLC30A8	Blood sugar	The main component of zinc supply for the production of insulin, and it is involved in processes of storage in insulin-secreting beta-cells of the pancreas.	CC
G6PC2	Blood sugar	Catalytic subunit of an enzyme glucose-6-phosphatase, and it, therefore, important influences the blood glucose level.	GG
MTNR1B	Blood sugar	Receptor for melatonin, influencing circadian rhythms.	CG
DGKB	Blood sugar	Diacylglycerol kinase regulates the level of diacylglycerol and the secretion of insulin.	GG
GCKR	Blood sugar	Inhibitor of glucokinase (GCK), which regulates the first step of metabolic pathways of sugars.	AG
ADCY5	Blood sugar	Enzyme cyclase, responsible for the synthesis of cAMP which regulates the activity of glucagon and adrenaline.	AA
FADS1	Omega-3 metabolism	An enzyme encoded by this gene is involved in conversion of ALA (α-linolenic acid) omega-3 fatty acid to EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).	CT
FADS1	Omega-3 and tri-glycerides	An enzyme encoded by this gene is involved in conversion of ALA (α-linolenic acid) omega-3 fatty acid to EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).	CT
PCSK1	Insulin sensitivity	An enzyme which processes proinsulin type I, and, therefore, has an important role in regulating the biosynthesis of insulin.	AA
ADIPOQ	Insulin sensitivity	A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.	GG
TCF7L2	Insulin sensitivity	A transcription factor which is involved in the Wingless-type (Wnt) signal path through which it influences diabetes type II.	CC
ADIPOQ	Adiponectin	A gene expressed in fatty tissue. It regulates fat metabolism and sensitivity to insulin.	GG

SKIN REJUVENATION

Gene	Analysis	Role of the gene	Genotype
CAT	Skin antioxidant capacity	<i>Catalase transforms reactive oxygen species into water and oxygen, and, therefore, reduces the toxic influence of hydrogen peroxide.</i>	GG
NQO1	Skin antioxidant capacity	<i>The enzyme which functions as a quinone reductase in connection to the conjugation of hydroquinones. It is involved in numerous detoxification pathways and biosynthetic processes, such as vitamin K-dependent glutamate carboxylation.</i>	CC
SOD2	Skin antioxidant capacity	<i>This gene is associated with the synthesis of superoxide dismutase, an enzyme found to be associated with the conversion of superoxide (O₂⁻) into oxygen (O₂) and hydrogen peroxide (H₂O₂). Superoxide dismutase is an important antioxidant which protects the cell from ionising radiation, oxidative stress and inflammatory cytokines.</i>	CT
GPX1	Skin antioxidant capacity	<i>Glutathione peroxidase functions in the detoxification of hydrogen peroxide and is one of the most important antioxidant enzymes in humans.</i>	CC
GLO1	Glycation protection	<i>GLO1 gene encodes an enzyme which is responsible for the protection of our cells against AGEs (advanced glycation end products).</i>	CC
GLO1	Glycation protection	<i>GLO1 gene encodes an enzyme which is responsible for the protection of our cells against AGEs (advanced glycation end products).</i>	AA
ACE2	Cellulite	<i>This gene encodes for an enzyme responsible for the conversion of angiotensin I to angiotensin II and catabolism of bradykinin. Studies have shown that circulating angiotensin II is a major regulator of fasting adipose blood flow and can therefore influence our susceptibility to cellulite development.</i>	AG
HIF1A	Cellulite	<i>This gene encodes the alpha subunit of HIF-1, which is a transcription factor. Activation of HIF1A impairs healthy adipose endocrine function and may in this way affect the formation of cellulite.</i>	CC
AQP3	Skin hydration	<i>A protein which acts as a glycerol transporter in the skin and plays an important role in regulating stratum corneum and epidermal glycerol content. It is involved in skin hydration, wound healing, and tumorigenesis.</i>	AA
MMP1	Skin elasticity	<i>The protein encoded by this gene belong to the enzyme family called matrix metalloproteinase. Upregulation of the MMP1 gene leads to faster dermal collagen degradation.</i>	AG
ELN	Skin elasticity	<i>This gene encodes for elastin, a major component of elastic fibres, which provides reversible extensibility to connective tissue. Studies have shown that mutations in the ELN gene affects its expression which results in lower amounts of elastin in our body.</i>	TT
HMCN	Stretch marks	<i>HMCN1 plays an important role in the organisation of hemidesmosomes in the epidermis.</i>	CG
ELN	Stretch marks	<i>This gene encodes for elastin, a major component of elastic fibres, which provides reversible extensibility to connective tissue. Studies have shown that mutations in the ELN gene affects its expression which results in lower amounts of elastin in our body.</i>	TT

NUTRIGENETICS GLOSSARY

- **Absorption:** uptake
- **Allele:** one of the variants of genetic material on a specific location (locus) of the chromosome. An individual has a chromosome pair where there are two alleles, which can be identical or not, and this is called homozygosis or heterozygosis. Different alleles in a human population can be the reason for inherited characteristics, such as blood type or hair colour.
- **Alkaloid:** a natural substance that is found in plants and has a bitter taste.
- **Amino acid:** a basic structural unit, from which protein is built. Its formation is encoded in DNA with three sequential nucleotides, which in different combinations give different amino acids: GCU is the code for amino acid alanine, UGU for cysteine. . .
- **Anticarcinogenic:** prevents the development of cancer.
- **Antioxidants:** substances which protect us from oxidative stress.
- **Artery:** a blood vessel that carries blood away from the heart. The main artery is the aorta.
- **BMI:** body mass index. Body mass divided by the square of body height (kg/m²).
- **Carbohydrates:** apart from proteins and fats, it is the main macronutrient. It is the basic source of energy.
- **Caucasians:** term, generally used in scientific articles for members of the white race.
- **Cell respiration:** a basic process where energy, carbon dioxide and water are formed from glucose and oxygen.
- **Chromosome:** a stick-like form of DNA molecule, which encodes hundreds or thousands of genes. In the nucleus, there are 22 autosomal chromosome pairs and 2 sex-determining chromosomes. In addition to the molecules of DNA, there are also proteins (mostly histones) present, around which the DNA is coiled. Such coiling and further formation result in a tightly formed chromosome, which takes up less space than an uncoiled molecule.
- **Chromosome (autosomal):** a chromosome, where both of the chromosomal pairs are similar. One chromosome out of the pair is given to an individual by his father and the other chromosome from his mother.
- **Chromosome (sex):** there are X (female) and Y (male) chromosomes existing. Women have a pair of two X chromosomes (XX) and men have an X and Y chromosome (XY), from which Y is inherited only from the father. Its presence/absence determines the sex of the child.
- **Chylomicron:** it helps cholesterol in passing through the intestinal mucus, and it contains a minimal amount of cholesterol and triglycerides.
- **Cofactor:** non-protein compound, bound to a protein, and is necessary for protein's biological activity.
- **Common variant (copy) of the gene:** DNA sequence of the analysed locus, which contains a nucleotide that is more common in a population (its frequency is higher than 50 percent).
- **Complex carbohydrates:** compound carbohydrates, which are slowly digested, and energy is provided for a long time, which makes us feel satiety longer. The increase in blood sugar level is slow, and not rapid, as in simple carbohydrates.
- **Creatine phosphate:** a high-energy molecule, which is a source of energy for the muscle.
- **Detoxification:** the process of removing harmful substances.
- **Diabetes:** a chronic state in which pancreatic cells do not produce enough insulin or the body cannot effectively use the produced insulin.
- **Dimethylation:** the addition of two methyl compounds.
- **DNA:** a molecule, found in the cell nucleus, which carries the instructions for the development of an organism. Human DNA is consisted of four different nucleotides and has the form of a double-helix coil. This means that two chains of DNA, which are anti-parallel and coil around one another. Anti-parallel means



that the nucleotide C is always paired with G, and A always with T.

- **Enzyme:** a protein involved in chemical processes in the body. Its purpose is to reduce the activation energy required for chemical reactions and thus facilitating their course. This enables faster conversion of substrate to product, for example, conversion of starch into glucose.
- **Essential fats:** plant fats, necessary for our body.
- **Fats:** important constituents and an energy source, which contains twice the amount of energy of carbohydrates or proteins.
- **Fibres:** indigestible carbohydrates, which are in charge of a good digestion and the feeling of satiety. They include cellulose, lignin and pectin.
- **Free radicals:** i unstable chemical substances, which harm the cell.
- **Gene:** Part of the DNA sequence that carries the information for the formation of protein. Genes are inherited from parents to their descendants and give information, which is needed for the formation and development of an organism.
- **Genetic analysis:** review, or the analysis of your genes.
- **Genetic makeup:** is a general term, which is usually a synonym for genotype, or variant of the DNA gene sequence. However, the term can refer also to the region of the genome, where the gene is not present.
- **Genetic risk:** risk for, for example, excess body weight, lack of a vitamin or a mineral, which is determined by your genes.
- **Genome:** the entire DNA which is present in the cell nucleus, and includes all the autosomal chromosomes, and both sex chromosomes.
- **Genotype:** allele variants of a gene, present in an individual. Genotype can represent all of the alleles in a cell, but mostly it is used for describing one or more genes, which together influence a certain characteristic.
- **Glycemic index:** it indicates how much a certain food increases blood sugar (it does not consider the amount of food).
- **Glycemic load:** it indicates how much a certain food increases blood sugar (it considers the amount of food).
- **Glycogen:** the basic structural form of glucose storage in our body.
- **Glucose:** the basic representative of carbohydrates, also called blood sugar.
- **Hydrogenised fats:** are trans fats, which are formed with heating of plant oils at high temperatures.
- **Hypothalamus:** is cherry-size part in the middle of the brain, and it is the centre of all information concerning endocrine hormones.
- **Insulin:** a hormone that regulates blood sugar level.
- **Insulin resistance:** the state of our body being irresponsive to insulin, the hormone that regulates blood sugar level.
- **Kcal:** kilocalorie, in lay terms, simply calories.
- **Lactose:** milk sugar, consisting of glucose and galactose.
- **LDL cholesterol:** harmful to our health and this is why its level should be as low as possible.
- **Lipolysis:** the process of fat metabolism.
- **Lipoprotein particles:** Bind cholesterol and transport it through the body.
- **Macronutrient:** group, consists of carbohydrates, proteins and fats (saturated, monounsaturated, polyunsaturated).
- **Metabolism:** the process of the breakdown, or formation of new substances in the body..
- **Micronutrients:** nutrients our body needs in small quantities, but are nevertheless vital to our health. This includes vitamins and minerals.
- **Monounsaturated fats:** an extremely beneficial type of fatty acids.
- **Monosaccharide:** the most basic and simple carbohydrate. For example glucose, fructose, mannose...
- **Muscle fibres:** cells that form muscles. Their name is due to their elongated shape.

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

SPORTS GENETICS GLOSSARY

- **Absolute Strength:** it refers to the ability to move objects, expressed in terms of absolute weight. For example: "She can squat 80 kilos for one repetition".
- **Cardiac Output:** the amount of blood that is moving through our cardio-vascular system in a minute.
- **Cardio-vascular endurance:** a description of overall aerobic capacity, which includes central (heart, lungs, blood vessels) and peripheral (muscles) components.
- **Continuous training:** the training that involves low to moderate intensity activity without rest intervals: walking, cycling, running, swimming.
- **Endurance (strength/muscular endurance):** strength endurance is the ability to execute a high number of repetitions with a given weight or to sustain a static muscular contraction for a long period of time.
- **Explosive strength:** the ability to express strength in a very fast manner.
- **Heart Rate:** number of heart contractions per minute.
- **Hypertrophy:** the term, related to cell growth, used when talking about muscle growth or fat cells volume changes.
- **Intensity:** the level of exertion. Or, "how hard is the effort, relative to one's maximal capacity". In the endurance field, intensity usually refers to a given percent of the maximal heart rate (e.g. 70%HRmax for a moderate Intensity). In the strength training field, it is usually presented by RM (repetitions maximum).
- **Interval training:** training that combines bouts of moderate to high-intensity performance with rest periods between them. The intensity of the bouts and the recovery time should be well planned and depend on the final goal of the training.
- **Maximal strength:** the maximal weight one can lift in a given movement pattern.
- **Plyometric exercise:** the exercise that engages the so-called "short-stretching cycle". Some examples: hoops, landing to jumping transition, medicine ball drills.
- **Power:** the mechanical work (W) done in a certain period of time (t), or W/t . The units of power are "Watts". As work equals force times distance (d), or $F \cdot d$, Power turns to be $Force \cdot Speed$ (d/t) or, applying to an athlete's ability and formulated in an accessible language - Power is the ability to express force in a fast manner.
- **Prehab:** a term, used to define a set of activities that aim to take care of known intrinsic (related to a person) injury risk factors. Some of the risk factors cannot be treated by an exercise intervention, but others definitely can. Among the risk factors that can be accessed



and treated by exercise are: inadequate range of motion; strength, timing and motor control deficits, asymmetry and low aerobic fitness. Usually, those Prehab interventions are prescribed after an appropriate screening procedure and are extremely personal, according to the activities the person takes part in and matching their personal characteristics. The athlete is guided to perform the set of exercises (self-myofascial release, mobility drills, stretching, strengthening, aerobics etc.) as a special warm-up routine or as an additional training session itself.

- **Rate of Perceived Exertion (RPE):** an alternative way to measure the intensity of the training effort. The person evaluates his own level of effort by grading it on the 6-20 scale (BORG scale) or 0-10 (OMNI scale). Researchers have found that a high correlation exists between the subjectively evaluated level of exertion and the scientifically measured one (%HRmax or %VO2Max).
- **Relative Strength:** it describes capability to execute Body Weight exercise (e.g. chin up, handstand push-ups...) or to move external objects, when the weight is expressed relative to his/her body weight. For example: "He can Deadlift 2 times his body weight" (2BW).
- **Resting heart rate (RHR):** the number of heart beats per minute in a seated posture, measured after a rest period. When you wake up in the morning, sit on your bed and count the heart rate (beats per minute) before you get involved in any kind of activity.
- **RM (Repetitions Maximum):** the maximal number of repetitions that may be executed with a "strict form" in a given exercise. For example, if someone's RM10 for Back Squat is 80 kg, this means that a person can lift an 80 kg barbell 10 times. RM1 refers to the maximal Intensity, (the weight that can be lifted only one time).
- **Strength:** the term is usually used to describe one's ability to apply force to external objects.
- **Stroke Volume:** the amount of blood that is pumped out from the heart to aorta with a single heart contraction.
- **Training Methods:** among the most widely used methods are continuous training and interval training. Other training methods are a variation or a combination of these two. Some forms of the methods are tempo, fartlek, HIIT, circuit training and time or volume dependent Density training (AMRAP, AFAP...).
- **Training Principles:** the principle of training designed for the achievement of the desired goals. The established principles are universal, but their applications should be adapted for the given field and person. Most of the principles are grounded in sports science and approved by time. The most well-known principles are overload principle, specificity principle, individualization principle, reversibility principle and diminishing returns principle.
- **VO2max:** the label for the maximum oxygen consumption of an individual which indicates the maximal volume of oxygen our body is able to use within one minute.
- **Volume:** the "amount of the work done". In the endurance field, it refers to the distance "covered" or to the time spent for the activity, while in the strength training field it usually means the total amount of repetitions done.
- **Weight/Resistance Training:** any type of training with an external resistance/load, aimed to develop various types of strength (maximal strength, strength endurance, explosive strength...) or to "build" muscle tissue. The volume, the intensity and the manner of exercise execution will define the main outcome of resistance training.
- **Weightlifting:** an Olympic sport event, where the athletes lift the loaded barbell from the ground to overhead in two lifting styles: Clean and Jerk technique and Snatch. The aim is to lift the highest weight possible. In CROSSFIT and in sport specific training those two lifting styles and their components (clean, jerk, hang clean, power snatch) are used for power development.

CEREALS AND STARCHY FOODS

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

CEREALS AND STARCHY FOODS

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

FRUITS

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

VEGETABLES, LEGUMES

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

NUTRITION CHARTS

FRUITS

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

VEGETABLES, LEGUMES

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

VEGETABLES, LEGUMES

<i>Food (100 g)</i>	<i>Food (general portion)</i>	<i>Calories</i>	<i>Proteins</i>	<i>Carbohydrates</i>	<i>Saturated fats</i>	<i>Monounsaturated fats</i>	<i>Polyunsaturated fats</i>	<i>Cholesterol</i>	<i>B6</i>
Bell pepper, red	half of a large bell pepper	31	1,0 g	6,3 g	0,00 g	0,00 g	0,10 g	0 mg	0,3 mg
Broccoli	1 cup, cubes	34	2,8 g	6,6 g	0,00 g	0,00 g	0,00 g	0 mg	0,2 mg
Cabbage, sour	1 cup	12	1,5 g	0,8 g	0,03 g	0,01 g	0,07 g	0 mg	0,2 mg
Cabbage, white, fresh	1 cup	25	1,3 g	5,8 g	0,00 g	0,00 g	0,00 g	0 mg	0,1 mg
Carrot	1 small carrot	41	0,9 g	9,6 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Cauliflower	1 cup, cubes	25	2,0 g	5,3 g	0,00 g	0,00 g	0,00 g	0 mg	0,2 mg
Chard	2 leafs	19	1,8 g	3,7 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Chick peas, cooked	half a cup	164	8,9 g	27,4 g	0,30 g	0,60 g	1,20 g	0 mg	0,1 mg
Dandelion	2 cups	45	2,7 g	9,2 g	0,20 g	0,00 g	0,30 g	0 mg	0,3 mg
Fennel	1 cup, cubes	31	1,2 g	7,3 g	0,09 g	0,07 g	0,17 g	0 mg	0,0 mg
Field beans, cooked	2/3 cup	110	7,6 g	19,7 g	0,10 g	0,10 g	0,20 g	0 mg	0,1 mg
Garlic	1 cup	149	6,4 g	33,1 g	0,10 g	0,00 g	0,20 g	0 mg	1,2 mg
Green kohlrabi, cooked	half a cup, sliced	29	1,8 g	6,7 g	0,00 g	0,00 g	0,10 g	0 mg	0,2 mg
Kale	1 cup	50	3,3 g	10,0 g	0,10 g	0,10 g	0,30 g	0 mg	0,3 mg
Kale, bud	1 cup	43	3,4 g	9,0 g	0,10 g	0,00 g	0,20 g	0 mg	0,2 mg
Kidney beans, cooked	half a cup	127	8,7 g	22,8 g	0,10 g	0,00 g	0,30 g	0 mg	0,1 mg
Kohlrabi	half a tuber	27	1,7 g	6,2 g	0,00 g	0,00 g	0,00 g	0 mg	0,2 mg
Lamb's lettuce	1 cup	21	2,0 g	3,6 g	0,02 g	0,01 g	0,08 g	0 mg	0,3 mg
Leek	1 cup	61	1,5 g	14,2 g	0,00 g	0,00 g	0,20 g	0 mg	0,2 mg
Lentils, cooked	half a cup	116	9,0 g	20,1 g	0,10 g	0,10 g	0,20 g	0 mg	0,2 mg
Parsley, green	10 shoots	36	3,0 g	6,3 g	0,10 g	0,30 g	0,10 g	0 mg	0,1 mg
Parsnips, cooked	1 cup	71	1,3 g	17,0 g	0,10 g	0,10 g	0,00 g	0 mg	0,1 mg
Peas, cooked	half a cup	40	3,3 g	6,8 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Radish	1 ½ cups, sliced	16	0,7 g	3,5 g	0,00 g	0,00 g	0,00 g	0 mg	0,1 mg
Red cabbage	1 ½ cup, grated	31	1,4 g	7,4 g	0,00 g	0,00 g	0,10 g	0 mg	0,2 mg
Soy milk	half a cup	45	2,9 g	3,5 g	0,20 g	0,40 g	1,20 g	0 mg	0,2 mg
Soy yogurt	1 cup	94	3,5 g	9,7 g	0,26 g	0,40 g	1,02 g	0 mg	0,0 mg
Soy, cooked	half a cup	141	12,3 g	11,1 g	0,70 g	1,20 g	3,00 g	0 mg	0,1 mg
Spinach, cooked	half a cup	23	3,0 g	3,7 g	0,00 g	0,00 g	0,10 g	0 mg	0,2 mg
Spring onion	1 cup, cubes	32	1,8 g	7,3 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Tomato	half of a large tomato	18	0,9 g	3,9 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg
Turnip	2 cups	28	0,9 g	6,4 g	0,00 g	0,00 g	0,10 g	0 mg	0,1 mg

VEGETABLES, LEGUMES

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magnesium	Manganese	Sodium	Zinc
46 mcg	0,0 mcg	0,0 mcg	128 mg	1,60 mg	0,4 mg	211 mg	0,1 mcg	7 mg	12 mg	0,1 mg	4 mg	0,30 mg
63 mcg	0,0 mcg	0,0 mcg	89 mg	0,80 mg	0,7 mg	316 mg	2,5 mcg	47 mg	21 mg	0,2 mg	33 mg	0,40 mg
31 mcg	0,0 mcg	0,0 mcg	20 mg	0,14 mg	0,6 mg	288 mg	0,6 mcg	48 mg	14 mg	0,1 mg	355 mg	0,00 mg
43 mcg	0,0 mcg	0,0 mcg	37 mg	0,20 mg	0,5 mg	170 mg	0,3 mcg	40 mg	12 mg	0,2 mg	18 mg	0,20 mg
19 mcg	0,0 mcg	0,0 mcg	6 mg	0,70 mg	0,3 mg	320 mg	0,1 mcg	33 mg	12 mg	0,1 mg	69 mg	0,20 mg
57 mcg	0,0 mcg	0,0 mcg	46 mg	0,10 mg	0,4 mg	303 mg	0,6 mcg	22 mg	15 mg	0,2 mg	30 mg	0,30 mg
14 mcg	0,0 mcg	0,0 mcg	30 mg	1,90 mg	1,8 mg	379 mg	0,9 mcg	51 mg	81 mg	0,4 mg	213 mg	0,40 mg
172 mcg	0,0 mcg	0,0 mcg	1 mg	0,40 mg	2,9 mg	291 mg	3,7 mcg	49 mg	48 mg	1,0 mg	7 mg	1,53 mg
27 mcg	0,0 mcg	0,0 mcg	35 mg	3,40 mg	3,1 mg	397 mg	0,5 mcg	187 mg	36 mg	0,3 mg	76 mg	0,40 mg
27 mcg	0,0 mcg	0,0 mcg	12 mg	0,58 mg	0,7 mg	414 mg	0,7 mcg	49 mg	17 mg	0,2 mg	52 mg	0,20 mg
104 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	1,5 mg	268 mg	2,6 mcg	36 mg	43 mg	0,4 mg	5 mg	0,38 mg
3 mcg	0,0 mcg	0,0 mcg	31 mg	0,10 mg	1,7 mg	401 mg	14,2 mcg	181 mg	25 mg	1,7 mg	17 mg	1,20 mg
12 mcg	0,0 mcg	0,0 mcg	54 mg	0,50 mg	0,4 mg	340 mg	0,8 mcg	25 mg	19 mg	0,1 mg	21 mg	0,03 mg
29 mcg	0,0 mcg	0,0 mcg	120 mg	0,88 mg	1,7 mg	447 mg	0,9 mcg	135 mg	34 mg	0,8 mg	43 mg	0,60 mg
61 mcg	0,0 mcg	0,0 mcg	85 mg	0,90 mg	1,4 mg	389 mg	1,6 mcg	42 mg	23 mg	0,3 mg	25 mg	~
130 mcg	0,0 mcg	0,0 mcg	1 mg	0,00 mg	2,2 mg	405 mg	1,1 mcg	35 mg	42 mg	0,4 mg	1 mg	1,10 mg
16 mcg	0,0 mcg	0,0 mcg	62 mg	0,50 mg	0,4 mg	350 mg	0,7 mcg	24 mg	19 mg	0,1 mg	20 mg	0,00 mg
14 mcg	0,0 mcg	0,0 mcg	38 mg	0,22 mg	2,2 mg	459 mg	0,9 mcg	38 mg	13 mg	0,4 mg	4 mg	~
64 mcg	0,0 mcg	0,0 mcg	12 mg	0,90 mg	2,1 mg	180 mg	1,0 mcg	59 mg	28 mg	0,5 mg	20 mg	0,10 mg
181 mcg	0,0 mcg	0,0 mcg	2 mg	0,10 mg	3,3 mg	369 mg	2,8 mcg	19 mg	36 mg	0,5 mg	2 mg	1,60 mg
152 mcg	0,0 mcg	0,0 mcg	133 mg	0,70 mg	6,2 mg	554 mg	0,1 mcg	138 mg	50 mg	0,2 mg	56 mg	1,10 mg
58 mcg	0,0 mcg	0,0 mcg	13 mg	1,00 mg	0,6 mg	367 mg	1,7 mcg	37 mg	29 mg	0,3 mg	10 mg	0,30 mg
29 mcg	0,0 mcg	0,0 mcg	48 mg	0,40 mg	2,0 mg	240 mg	0,7 mcg	42 mg	26 mg	0,2 mg	240 mg	1,64 mg
25 mcg	0,0 mcg	0,0 mcg	15 mg	0,00 mg	0,3 mg	233 mg	0,6 mcg	25 mg	10 mg	0,1 mg	39 mg	0,30 mg
18 mcg	0,0 mcg	0,0 mcg	57 mg	0,10 mg	0,8 mg	243 mg	0,6 mcg	45 mg	16 mg	0,2 mg	27 mg	0,20 mg
32 mcg	1,1 mcg	12,0 mcg	7 mg	2,50 mg	0,5 mg	141 mg	2,3 mcg	140 mg	10 mg	~	50 mg	~
6 mcg	~	1,3 mcg	13 mg	0,31 mg	1,06 mg	0 mg	13,0 mcg	118 mg	40 mg	~	13 mg	~
111 mcg	0,0 mcg	0,0 mcg	17 mg	0,21 mg	2,5 mg	539 mg	1,4 mcg	145 mg	60 mg	0,5 mg	14 mg	0,90 mg
146 mcg	0,0 mcg	0,0 mcg	10 mg	2,10 mg	3,6 mg	466 mg	0,5 mcg	136 mg	87 mg	0,9 mg	70 mg	0,80 mg
64 mcg	0,0 mcg	0,0 mcg	19 mg	0,50 mg	1,5 mg	276 mg	0,6 mcg	72 mg	20 mg	0,2 mg	16 mg	0,40 mg
15 mcg	0,0 mcg	0,0 mcg	13 mg	0,50 mg	0,3 mg	237 mg	0,0 mcg	10 mg	11 mg	0,1 mg	5 mg	0,10 mg
15 mcg	0,0 mcg	0,0 mcg	21 mg	0,00 mg	0,3 mg	191 mg	0,7 mcg	30 mg	11 mg	0,1 mg	67 mg	0,30 mg

NUTS AND SEEDS

<i>Food (100 g)</i>	<i>Food (general portion)</i>	<i>Calories</i>	<i>Proteins</i>	<i>Carbohydrates</i>	<i>Saturated fats</i>	<i>Monounsaturated fats</i>	<i>Polyunsaturated fats</i>	<i>Cholesterol</i>	<i>B6</i>
Almonds	1 cup	575	21,2 g	21,7 g	3,70 g	30,90 g	12,10 g	0 mg	0,1 mg
Brazil nuts	7 tablespoons	656	14,3 g	12,3 g	15,10 g	24,60 g	20,60 g	0 mg	0,1 mg
Cashews	7 tablespoons	587	17,6 g	27,6 g	9,80 g	29,10 g	8,40 g	0 mg	0,3 mg
Chestnuts, cooked	1 cup	131	2,0 g	27,8 g	0,30 g	0,50 g	0,50 g	0 mg	0,2 mg
Hazelnuts	10 tablespoons	628	15,0 g	16,7 g	4,50 g	45,70 g	7,90 g	0 mg	0,6 mg
Macadamia	3/4 cup	718	7,9 g	14,2 g	12,10 g	58,90 g	1,50 g	0 mg	0,3 mg
Peanuts	7 tablespoons	567	25,8 g	16,1 g	6,80 g	24,40 g	15,60 g	0 mg	0,3 mg
Pine nuts	3/4 cup	673	13,7 g	13,1 g	4,90 g	18,76 g	34,07 g	0 mg	0,1 mg
Pistachios	3/4 cup	557	20,6 g	28,0 g	5,40 g	23,30 g	13,50 g	0 mg	1,7 mg
Poppy seeds	11 teaspoons	525	18,0 g	28,1 g	4,50 g	6,00 g	28,60 g	0 mg	0,2 mg
Pumpkin seeds, dried	10 teaspoons	541	24,5 g	17,8 g	8,70 g	14,30 g	20,90 g	0 mg	0,2 mg
Sesame seeds	11 teapoons	631	20,5 g	12,1 g	9,10 g	23,90 g	25,50 g	0 mg	0,4 mg
Walnuts	1 cup	654	15,2 g	13,7 g	6,10 g	8,90 g	47,20 g	0 mg	0,5 mg

FISH AND SEAFOOD

Anchovies	1 fillet	131	20,4 g	0,0 g	1,30 g	1,20 g	1,60 g	60 mg	0,1 mg
Brown trout, farmed	1 fillet	148	20,8 g	0,0 g	1,10 g	3,30 g	1,50 g	58 mg	0,2 mg
Cod	1 fillet	82	17,8 g	0,0 g	0,10 g	0,10 g	0,20 g	43 mg	0,2 mg
Eel, cooked	1 small fillet	236	23,7 g	0,0 g	3,00 g	9,20 g	1,20 g	161 mg	0,1 mg
Gray mullet	1 fillet	117	19,4 g	0,0 g	1,10 g	1,10 g	0,70 g	49 mg	0,4 mg
Hake	1 fillet	82	17,9 g	0,0 g	0,10 g	0,10 g	0,20 g	37 mg	0,4 mg
Herring	100 g	158	18,0 g	0,0 g	2,00 g	3,70 g	2,10 g	60 mg	0,3 mg
Lobster	half a lobster	90	18,8 g	0,5 g	0,20 g	0,30 g	0,20 g	95 mg	0,1 mg
Mackerel	1 small fillet	205	18,6 g	0,0 g	3,30 g	5,50 g	3,30 g	70 mg	0,4 mg
Mussels, cooked	2 cup	172	23,8 g	7,4 g	0,90 g	1,00 g	1,20 g	56 mg	0,1 mg
Octopus	100 g	82	14,9 g	2,2 g	0,20 g	0,20 g	0,20 g	48 mg	0,4 mg
Salmon	1 small fillet	208	20,4 g	0,0 g	3,00 g	3,80 g	3,90 g	55 mg	0,6 mg
Sardines	2 Fish	117	19,7 g	0,0 g	0,82 g	0,44 g	1,15 g	81 mg	~
Sardines, canned	2 Fish	208	24,6 g	0,0 g	1,50 g	3,90 g	5,10 g	142 mg	0,2 mg
Seabass	1 fillet	97	18,4 g	0,0 g	0,50 g	0,40 g	0,70 g	41 mg	0,4 mg
Squid, fried	1 cup	175	17,9 g	7,8 g	1,90 g	2,70 g	2,10 g	260 mg	0,1 mg
Tuna in its own juice	100 g	128	23,6 g	0,0 g	0,80 g	0,80 g	1,10 g	42 mg	0,2 mg
Tuna, ordinary	1 small fillet	108	23,4 g	0,0 g	0,20 g	0,20 g	0,30 g	45 mg	0,9 mg

NUTS AND SEEDS

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magnezij	Manganese	Sodium	Zinc
50 mcg	0,0 mcg	0,0 mcg	0 mg	26,20 mg	3,7 mg	705 mg	2,5 mcg	264 mg	268 mg	2,3 mg	1 mg	3,10 mg
22 mcg	0,0 mcg	0,0 mcg	1 mg	5,70 mg	2,4 mg	659 mg	1917,0 mcg	160 mg	376 mg	1,2 mg	3 mg	4,10 mg
68 mcg	0,0 mcg	0,0 mcg	0 mg	0,90 mg	5,0 mg	546 mg	11,5 mcg	43 mg	258 mg	0,8 mg	15 mg	5,80 mg
38 mcg	0,0 mcg	0,0 mcg	27 mg	0,50 mg	1,7 mg	715 mg	0,9 mcg	46 mg	54 mg	0,5 mg	27 mg	0,30 mg
113 mcg	0,0 mcg	0,0 mcg	6 mg	15,00 mg	4,7 mg	680 mg	2,4 mcg	114 mg	163 mg	6,2 mg	0 mg	2,50 mg
11 mcg	0,0 mcg	0,0 mcg	1 mg	0,50 mg	3,7 mg	368 mg	3,6 mcg	85 mg	130 mg	4,1 mg	5 mg	1,30 mg
240 mcg	0,0 mcg	0,0 mcg	0 mg	8,30 mg	4,6 mg	705 mg	7,2 mcg	92 mg	168 mg	1,9 mg	18 mg	2,10 mg
34 mcg	0,0 mcg	0,0 mcg	1 mg	9,30 mg	5,5 mg	597 mg	0,7 mcg	16 mg	251 mg	8,8 mg	2 mg	6,50 mg
51 mcg	0,0 mcg	0,0 mcg	1 mg	2,30 mg	4,2 mg	1025 mg	7,0 mcg	107 mg	121 mg	1,2 mg	1 mg	2,20 mg
82 mcg	0,0 mcg	0,0 mcg	1 mg	1,80 mg	9,8 mg	719 mg	13,5 mcg	1438 mg	347 mg	6,7 mg	26 mg	7,90 mg
58 mcg	0,0 mcg	0,0 mcg	2 mg	0,00 mg	15,0 mg	807 mg	5,6 mcg	43 mg	535 mg	3,0 mg	18 mg	7,80 mg
115 mcg	0,0 mcg	0,0 mcg	0 mg	1,70 mg	6,4 mg	370 mg	97,5 mcg	600 mg	345 mg	1,4 mg	47 mg	6,70 mg
98 mcg	0,0 mcg	0,0 mcg	1 mg	0,70 mg	2,9 mg	441 mg	4,9 mcg	98 mg	158 mg	3,4 mg	2 mg	3,10 mg

FISH AND SEAFOOD

9 mcg	0,6 mcg	1,7 mcg	0 mg	0,60 mg	3,3 mg	383 mg	36,5 mcg	147 mg	41 mg	0,1 mg	104 mg	1,70 mg
13 mcg	7,8 mcg	3,9 mcg	1 mg	0,20 mg	1,5 mg	361 mg	12,6 mcg	43 mg	22 mg	0,9 mg	52 mg	0,50 mg
7 mcg	0,9 mcg	1,1 mcg	1 mg	0,60 mg	0,4 mg	413 mg	33,1 mcg	16 mg	32 mg	0,0 mg	54 mg	0,50 mg
17 mcg	2,9 mcg	23,3 mcg	2 mg	4,00 mg	0,6 mg	349 mg	90,0 mcg	26 mg	26 mg	0,0 mg	65 mg	2,10 mg
9 mcg	0,2 mcg	18,3 mcg	1 mg	1,00 mg	1,0 mg	357 mg	149,0 mcg	41 mg	29 mg	0,0 mg	65 mg	0,50 mg
7 mcg	0,9 mcg	4,2 mcg	3 mg	0,60 mg	0,3 mg	403 mg	36,5 mcg	7 mg	24 mg	0,0 mg	71 mg	0,50 mg
10 mcg	13,7 mcg	1,0 mcg	1 mg	1,10 mg	1,1 mg	327 mg	36,5 mcg	57 mg	32 mg	0,0 mg	90 mg	1,00 mg
9 mcg	0,9 mcg	0,0 mcg	0 mg	1,50 mg	0,3 mg	275 mg	41,4 mcg	48 mg	27 mg	0,1 mg	296 mg	4,10 mg
1 mcg	8,7 mcg	9,0 mcg	1 mg	1,50 mg	1,6 mg	314 mg	44,1 mcg	12 mg	76 mg	0,0 mg	90 mg	0,60 mg
76 mcg	24,0 mcg	0,0 mcg	14 mg	0,55 mg	6,7 mg	268 mg	89,6 mcg	33 mg	37 mg	6,8 mg	369 mg	2,70 mg
16 mcg	20,0 mcg	0,0 mcg	5 mg	1,20 mg	5,3 mg	350 mg	44,8 mcg	53 mg	30 mg	0,0 mg	230 mg	1,70 mg
26 mcg	3,2 mcg	16,0 mcg	4 mg	3,60 mg	0,3 mg	363 mg	24,0 mcg	9 mg	27 mg	0,0 mg	59 mg	0,40 mg
~	~	~	~	0,00 mg	2,7 mg	474 mg	640,6 mcg	379 mg	40 mg	0,2 mg	59 mg	~
12 mcg	8,9 mcg	6,8 mcg	0 mg	2,00 mg	2,9 mg	397 mg	52,7 mcg	382 mg	39 mg	0,1 mg	505 mg	1,30 mg
5 mcg	0,3 mcg	67,8 mcg	0 mg	0,50 mg	0,3 mg	256 mg	36,5 mcg	10 mg	41 mg	0,0 mg	68 mg	0,40 mg
14 mcg	1,2 mcg	0,0 mcg	4 mg	1,20 mg	1,0 mg	279 mg	51,8 mcg	39 mg	38 mg	0,1 mg	306 mg	1,70 mg
2 mcg	1,2 mcg	4,5 mcg	0 mg	0,90 mg	1,0 mg	237 mg	65,7 mcg	14 mg	33 mg	0,0 mg	377 mg	0,50 mg
2 mcg	0,5 mcg	4,5 mcg	1 mg	0,50 mg	0,7 mg	444 mg	36,5 mcg	16 mg	50 mg	0,0 mg	37 mg	0,40 mg

MILK AND DAIRY PRODUCTS

Food (100 g)	Food (general portion)	Calories	Proteins	Carbohydrates	Saturated fats	Monounsaturated fats	Polyunsaturated fats	Cholesterol	B6
Butter, raw	7 tablespoon	717	0,9 g	0,1 g	51,40 g	21,00 g	3,00 g	215 mg	0,0 mg
Buttermilk	half a cup	56	4,1 g	5,3 g	1,20 g	0,60 g	0,10 g	8 mg	0,1 mg
Curd, 20% m.m.	8 tablespoons	109	12,5 g	2,7 g	2,76 g	0,15 g	0,03 g	17 mg	0,1 mg
Curd, 40% m.m.	8 tablespoons	160	11,1 g	2,6 g	6,17 g	0,34 g	0,07 g	37 mg	0,1 mg
Curd, skimmed	8 tablespoons	70	13,5 g	3,2 g	0,17 g	0,08 g	0,00 g	1 mg	0,1 mg
Edamer cheese	100 g	357	25,0 g	1,4 g	17,60 g	8,10 g	0,70 g	89 mg	0,1 mg
Gauda cheese	100 g	356	24,9 g	2,2 g	17,60 g	7,70 g	0,70 g	114 mg	0,1 mg
Kefir 1,1%	half a cup	41	3,1 g	4,6 g	0,57 g	0,00 g	0,00 g	0 mg	0,1 mg
Margarine, regular	7 tablespoon	713	0,2 g	0,7 g	14,20 g	36,40 g	26,70 g	0 mg	0,0 mg
Margarine, vegetable	7 tablespoon	526	0,6 g	0,0 g	10,00 g	20,30 g	24,70 g	1 mg	0,0 mg
Mozzarella	100 g	300	22,2 g	2,2 g	13,20 g	6,60 g	0,80 g	79 mg	0,1 mg
Pasteurized milk 1,6%	half a cup	46	3,0 g	4,8 g	0,91 g	0,41 g	0,04 g	5 mg	0,1 mg
Pasteurized whole milk	half a cup	60	3,2 g	5,3 g	1,90 g	0,80 g	0,20 g	10 mg	0,1 mg
Ricotta cheese	100 g	174	11,3 g	0,3 g	8,30 g	3,60 g	0,40 g	51 mg	0,0 mg
Sour cream	8 tablespoons	193	2,1 g	3,5 g	11,50 g	5,10 g	0,80 g	52 mg	0,1 mg
Trappist cheese	100 g	358	26,6 g	0,0 g	17,38 g	0,42 g	0,20 g	0 mg	0,0 mg

OILS

Avocado oil	7 tablespoons	884	0,0 g	0,0 g	11,60 g	70,60 g	13,50 g	~	0,0 mg
Butter, cashew nuts	6 tablespoons	587	17,6 g	27,6 g	9,80 g	29,10 g	8,40 g	0 mg	0,3 mg
Butter, peanut	6 tablespoons	588	25,1 g	20,0 g	10,50 g	24,20 g	14,20 g	0 mg	0,5 mg
Coconut oil	7 tablespoons	862	0,0 g	0,0 g	86,50 g	5,80 g	1,80 g	0 mg	0,0 mg
Fish oil, sardine	7 tablespoons	902	0,0 g	0,0 g	29,90 g	33,80 g	31,90 g	710 mg	0,0 mg
Linseed oil	7 tablespoons	884	0,0 g	0,0 g	9,40 g	20,20 g	66,00 g	0 mg	0,0 mg
Mustard oil	7 tablespoons	884	0,0 g	0,0 g	11,60 g	59,20 g	21,20 g	~	0,0 mg
Olive oil	7 tablespoons	884	0,0 g	0,0 g	13,80 g	73,00 g	10,50 g	0 mg	0,0 mg
Palm oil	7 tablespoons	884	0,0 g	0,0 g	49,30 g	37,00 g	9,30 g	0 mg	0,0 mg
Pumpkin seed oil	7 tablespoons	884	0,0 g	0,0 g	16,63 g	13,32 g	9,01 g	0 mg	0,0 mg
Rapeseed oil	7 tablespoons	884	0,0 g	0,0 g	7,40 g	63,30 g	28,10 g	0 mg	0,0 mg
Sunflower oil, refined	7 tablespoons	884	0,0 g	0,0 g	13,00 g	46,20 g	36,40 g	0 mg	0,0 mg
Walnut oil	7 tablespoons	884	0,0 g	0,0 g	9,10 g	22,80 g	63,30 g	0 mg	0,0 mg
Wheat germ oil	7 tablespoons	884	0,0 g	0,0 g	18,80 g	15,10 g	61,70 g	0 mg	0,0 mg

MILK AND DAIRY PRODUCTS

B9	B12	D	C	E	Iron	Potassium	Selenium	Calcium	Magnesium	Manganese	Sodium	Zinc
3 mcg	0,2 mcg	1,4 mcg	0 mg	2,30 mg	0,0 mg	24 mg	1,0 mcg	24 mg	2 mg	0,0 mg	576 mg	0,10 mg
6 mcg	0,4 mcg	0,3 mcg	2 mg	0,10 mg	0,1 mg	180 mg	2,3 mcg	143 mg	13 mg	0,0 mg	86 mg	0,20 mg
16 mcg	0,8 mcg	0,1 mcg	1 mg	0,12 mg	0,4 mg	87 mg	5,0 mcg	85 mg	11 mg	0,1 mg	35 mg	0,50 mg
28 mcg	0,7 mcg	0,2 mcg	1 mg	0,27 mg	0,3 mg	82 mg	0,0 mcg	95 mg	10 mg	0,1 mg	34 mg	0,69 mg
16 mcg	0,9 mcg	0,0 mcg	1 mg	0,01 mg	0,4 mg	95 mg	9,4 mcg	92 mg	12 mg	0,1 mg	40 mg	0,50 mg
16 mcg	1,5 mcg	36,0 mcg	0 mg	0,20 mg	0,4 mg	188 mg	14,5 mcg	731 mg	30 mg	0,0 mg	965 mg	3,80 mg
21 mcg	1,5 mcg	1,3 mcg	0 mg	0,20 mg	0,2 mg	121 mg	14,5 mcg	700 mg	29 mg	0,0 mg	819 mg	3,90 mg
5 mcg	0,5 mcg	0,1 mcg	1 mg	0,11 mg	0,1 mg	160 mg	0,0 mcg	120 mg	14 mg	0,0 mg	38 mg	~
1 mcg	0,1 mcg	2,5 mcg	0 mg	15,40 mg	0,0 mg	17 mg	0,0 mcg	3 mg	1 mg	0,0 mg	657 mg	0,00 mg
1 mcg	0,1 mcg	2,5 mcg	0 mg	5,00 mg	0,0 mg	30 mg	0,0 mcg	21 mg	2 mg	0,0 mg	785 mg	0,00 mg
7 mcg	2,3 mcg	4,8 mcg	0 mg	0,20 mg	0,4 mg	76 mg	17,0 mcg	505 mg	20 mg	0,0 mg	627 mg	2,90 mg
4 mcg	0,4 mcg	0,0 mcg	2 mg	0,04 mg	0,0 mg	155 mg	2,5 mcg	118 mg	12 mg	0,0 mg	47 mg	0,40 mg
5 mcg	0,4 mcg	1,0 mcg	2 mg	0,10 mg	0,0 mg	143 mg	3,7 mcg	113 mg	10 mg	0,0 mg	40 mg	0,40 mg
12 mcg	0,3 mcg	3,0 mcg	0 mg	0,10 mg	0,4 mg	105 mg	14,5 mcg	207 mg	11 mg	0,0 mg	84 mg	1,20 mg
7 mcg	0,3 mcg	4,2 mcg	1 mg	0,40 mg	0,2 mg	141 mg	2,6 mcg	110 mg	10 mg	0,0 mg	80 mg	0,40 mg
3 mcg	2,1 mcg	0,0 mcg	0 mg	0,42 mg	0,3 mg	67 mg	0,0 mcg	920 mg	29 mg	0,0 mg	1 mg	~

OILS

0 mcg	0,0 mcg	0,0 mcg	0 mg	~	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
68 mcg	0,0 mcg	0,0 mcg	0 mg	0,92 mg	5,0 mg	546 mg	11,5 mcg	43 mg	258 mg	0,8 mg	15 mg	5,20 mg
74 mcg	0,0 mcg	0,0 mcg	0 mg	9,00 mg	1,9 mg	649 mg	5,6 mcg	43 mg	154 mg	1,5 mg	459 mg	2,50 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	0,10 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	99,6 mcg	0 mg	~	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	17,50 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	~	0 mg	~
0 mcg	0,0 mcg	0,0 mcg	0 mg	~	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	14,30 mg	0,6 mg	1 mg	0,0 mcg	1 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	15,90 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	~	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	0,00 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	~
0 mcg	0,0 mcg	0,0 mcg	0 mg	17,50 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	~
0 mcg	0,0 mcg	0,0 mcg	0 mg	41,10 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	0,40 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg
0 mcg	0,0 mcg	0,0 mcg	0 mg	149,00 mg	0,0 mg	0 mg	0,0 mcg	0 mg	0 mg	0,0 mg	0 mg	0,00 mg

MEAT AND REPLACEMENTS

<i>Food (100 g)</i>	<i>Food (general portion)</i>	<i>Calories</i>	<i>Proteins</i>	<i>Carbohydrates</i>	<i>Saturated fats</i>	<i>Monounsaturated fats</i>	<i>Polyunsaturated fats</i>	<i>Cholesterol</i>	<i>B6</i>
Beef, outer thigh	1 steak	192	20,7 g	0,0 g	4,50 g	5,00 g	0,40 g	58 mg	0,6 mg
Beef, upper thigh	1 steak	135	22,9 g	0,0 g	1,40 g	1,70 g	0,20 g	55 mg	0,7 mg
Chicken liver	100 g	116	16,9 g	0,0 g	1,60 g	1,20 g	1,30 g	345 mg	0,9 mg
Chicken without skin	2 thighs	119	19,7 g	0,0 g	1,00 g	1,20 g	1,00 g	83 mg	0,3 mg
Cooked ham	100 g	172	22,3 g	0,3 g	2,80 g	4,00 g	1,00 g	58 mg	0,3 mg
Deer meat	100 g	120	23,0 g	0,0 g	0,90 g	0,70 g	0,50 g	85 mg	0,4 mg
Domestic goose, without skin	half a portion	161	22,8 g	0,0 g	2,80 g	1,90 g	0,90 g	84 mg	0,6 mg
Egg, hard boiled	1 egg	155	12,6 g	1,1 g	3,30 g	4,10 g	1,40 g	424 mg	0,1 mg
Fried egg	1,5 eggs	196	13,6 g	0,9 g	4,30 g	6,30 g	2,70 g	457 mg	0,2 mg
Karst prosciutto	100 g	250	28,6 g	3,6 g	7,14 g	0,00 g	0,00 g	107 mg	~
Lamb thigh	1 steak	185	19,0 g	0,0 g	4,90 g	4,70 g	0,90 g	67 mg	0,2 mg
Mortadella	100 g	311	16,4 g	3,0 g	9,50 g	11,40 g	3,10 g	56 mg	0,1 mg
Pork hot dog	1 pair	269	12,8 g	0,3 g	8,70 g	10,90 g	2,20 g	66 mg	0,3 mg
Pork liver	100 g	134	21,4 g	2,5 g	1,20 g	0,50 g	0,90 g	301 mg	0,7 mg
Pork, shoulder	100 g	236	17,2 g	0,0 g	6,20 g	8,00 g	1,90 g	71 mg	0,3 mg
Rabbit meat	100 g	136	20,0 g	0,0 g	1,70 g	1,50 g	1,10 g	57 mg	0,5 mg
Rabbit, wild	100 g	114	21,8 g	0,0 g	0,70 g	0,60 g	0,50 g	81 mg	~
Roast horse meat	100 g	175	28,1 g	0,0 g	1,90 g	2,10 g	0,90 g	68 mg	0,3 mg
Scrambled eggs	1 egg	167	11,1 g	2,2 g	3,70 g	4,80 g	2,10 g	352 mg	0,1 mg
Turkey	1 steak	160	20,4 g	0,0 g	2,30 g	2,90 g	2,00 g	68 mg	0,4 mg
Turkey hot dog	1 pair	233	12,2 g	3,8 g	4,00 g	5,70 g	3,90 g	77 mg	0,1 mg
Turkey liver	100 g	228	17,8 g	2,3 g	5,50 g	7,40 g	1,70 g	331 mg	1,5 mg

MEAT AND REPLACEMENTS

<i>B9</i>	<i>B12</i>	<i>D</i>	<i>C</i>	<i>E</i>	<i>Iron</i>	<i>Potassium</i>	<i>Selenium</i>	<i>Calcium</i>	<i>Magnesium</i>	<i>Manganese</i>	<i>Sodium</i>	<i>Zinc</i>
11 mcg	1,5 mcg	~	0 mg	0,40 mg	1,7 mg	327 mg	24,8 mcg	20 mg	22 mg	0,0 mg	56 mg	4,80 mg
13 mcg	1,6 mcg	~	0 mg	0,30 mg	2,0 mg	362 mg	29,2 mcg	20 mg	25 mg	0,0 mg	61 mg	4,30 mg
588 mcg	16,6 mcg	0,0 mcg	18 mg	0,70 mg	9,0 mg	230 mg	54,0 mcg	8 mg	19 mg	0,3 mg	71 mg	2,70 mg
10 mcg	0,4 mcg	0,0 mcg	0 mg	0,30 mg	1,0 mg	231 mg	13,5 mcg	10 mg	24 mg	0,0 mg	86 mg	0,00 mg
3 mcg	0,7 mcg	~	0 mg	0,30 mg	1,4 mg	386 mg	19,5 mcg	8 mg	21 mg	0,0 mg	969 mg	2,60 mg
4 mcg	6,3 mcg	~	0 mg	0,20 mg	3,4 mg	318 mg	9,7 mcg	5 mg	23 mg	0,0 mg	51 mg	2,10 mg
31 mcg	0,5 mcg	~	7 mg	~	2,6 mg	420 mg	16,8 mcg	13 mg	24 mg	0,0 mg	87 mg	2,30 mg
44 mcg	1,1 mcg	2,9 mcg	0 mg	1,00 mg	1,2 mg	126 mg	30,8 mcg	50 mg	10 mg	0,0 mg	124 mg	1,05 mg
51 mcg	1,4 mcg	3,1 mcg	0 mg	1,20 mg	2,0 mg	147 mg	34,2 mcg	59 mg	13 mg	0,0 mg	204 mg	1,40 mg
~	~	~	0 mg	~	1,9 mg	510 mg	16,7 mcg	0 mg	38 mg	0,0 mg	1714 mg	~
21 mcg	2,5 mcg	~	0 mg	~	1,7 mg	267 mg	21,9 mcg	7 mg	25 mg	0,0 mg	58 mg	4,70 mg
3 mcg	1,5 mcg	12,3 mcg	0 mg	0,20 mg	1,4 mg	163 mg	22,6 mcg	18 mg	11 mg	0,0 mg	1246 mg	2,10 mg
3 mcg	0,5 mcg	~	2 mg	~	3,7 mg	264 mg	27,8 mcg	267 mg	15 mg	0,0 mg	816 mg	2,02 mg
212 mcg	26,0 mcg	~	25 mg	0,60 mg	23,3 mg	273 mg	52,7 mcg	9 mg	18 mg	0,3 mg	87 mg	5,80 mg
5 mcg	0,7 mcg	6,6 mcg	1 mg	0,20 mg	1,1 mg	302 mg	25,5 mcg	15 mg	18 mg	0,0 mg	65 mg	2,70 mg
8 mcg	7,2 mcg	~	0 mg	~	1,6 mg	330 mg	23,7 mcg	13 mg	19 mg	0,0 mg	41 mg	1,60 mg
~	~	~	0 mg	~	3,2 mg	378 mg	9,4 mcg	12 mg	29 mg	~	50 mg	~
~	3,2 mcg	~	2 mg	~	5,0 mg	379 mg	13,5 mcg	8 mg	25 mg	0,0 mg	55 mg	3,80 mg
30 mcg	0,8 mcg	14,4 mcg	0 mg	1,10 mg	1,2 mg	138 mg	22,5 mcg	71 mg	12 mg	0,0 mg	280 mg	1,00 mg
8 mcg	0,4 mcg	~	0 mg	0,40 mg	1,4 mg	266 mg	24,4 mcg	15 mg	22 mg	0,0 mg	65 mg	1,30 mg
9 mcg	0,8 mcg	6,9 mcg	0 mg	0,60 mg	1,5 mg	392 mg	15,1 mcg	148 mg	14 mg	0,0 mg	1078 mg	~
677 mcg	49,4 mcg	~	25 mg	0,10 mg	12,0 mg	255 mg	70,8 mcg	5 mg	15 mg	0,2 mg	71 mg	3,40 mg

*1 cup = 2 dl
*1 teaspoon = 5 ml
*1 tablespoon = 15 ml

Weight loss regain

- Goyenechea et al. (2009). The - 11391 G/A polymorphism of the adiponectin gene promoter is associated with metabolic syndrome traits and the outcome of an energy-restricted diet in obese subjects. *Horm Metab Res* 41(1): 55-61

Risk of being overweight

- Benzinou et al. (2008). Common nonsynonymous variants in PCSK1 confer risk of obesity. *Nat Genet* 40(8): 943-945
- Cheung et al. (2010). Obesity susceptibility genetic variants identified from recent genome-wide association studies: implications in a chinese population. *J Clin Endocrinol Metab* 95(3): 1395-1403
- 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
- 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
- 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
- Wang et al. (2011). A genome-wide association study on obesity and obesity-related traits. *PLoS One* 6(4)
- Wheeler et al. (2013). Genome-wide SNP and CNV analysis identifies common and low-frequency variants associated with severe early-onset obesity. *Net Genet* 45(5): 513-517
- 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
- Xi et al. (2013). Study of 11 BMI-Associated Loci Identified in GWAS for Associations with Central Obesity in the Chinese Children. *PLoS ONE* 8(2)
- Zhang et al. (2012). FTO genotype and 2-year change in body composition and fat distribution in response to weight-loss diets: the POUNDS LOST Trial. *Diabetes*. 61(11):3005-30011

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
- Smith et al. (2013). Apolipoprotein A2 polymorphism interacts with intakes of dairy foods to influence body weight in 2 U.S. populations. *J Nutr*. 143(12):1865-1871

Response to monounsaturated fats

- Warodomwichit et al. (2009). ADIPOQ polymorphisms, monounsaturated fatty acids, and obesity risk: the GOLDN study. *Obesity* 17(3): 510-517
- Warodomwichit et al. (2009). The monounsaturated fatty acid intake modulates the effect of ADIPOQ polymorphisms on obesity. *Obesity (Silver Spring)* 17(3): 510-517

Response to polyunsaturated fats

- Contreras et al. (2013). PPAR- α as a Key Nutritional and Environmental Sensor for Metabolic Adaptation. *Adv Nutr*. 4(4): 439-452.
- Rudkowska et al. (2014). Genome-wide association study of the plasma triglyceride response to an n-3 polyunsaturated fatty acid supplementation. *J Lipid Res*. 55(7): 1245-1253.
- 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

Response to carbohydrates

- 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
- 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

Vitamins

- Cheung et al. (2013). Genetic variant in vitamin D binding protein is associated with serum 25-hydroxyvitamin D and vitamin D insufficiency in southern Chinese. *J Hum Genet* 58(11): 749-751
- Crider et al. (2011). MTHFR 677C->T genotype is associated with folate and homocysteine concentrations in a large, population-based, double-blind trial of folic acid supplementation. *Am J Clin Nutr*. 93(6):1365-1372.

SCIENTIFIC SOURCES

- de Bree et al. (2003). Effect of the methylenetetrahydrofolate reductase 677C-->T mutation on the relations among folate intake and plasma folate and homocysteine concentrations in a general population sample. *Am J Clin Nutr* 77(3): 687-693
- Hazra et al. (2009). Genome-wide significant predictors of metabolites in the one-carbon metabolism pathway. *Hum Mol Genet* 18(23): 4677-4687
- Qin et al. (2012). Effect of folic acid intervention on the change of serum folate level in hypertensive Chinese adults: do methylenetetrahydrofolate reductase and methionine synthase gene polymorphisms affect therapeutic responses? *Pharmacogenet Genomics*. 22(6):421-428
- Robien et al. (2013). Genetic and environmental predictors of serum 25-hydroxyvitamin D concentrations among middle-aged and elderly Chinese in Singapore. *Br J Nutr* 109(3): 493-502
- Solis et al. (2008) Folate Intake at RDA Levels Is Inadequate for Mexican American Men with the Methylenetetrahydrofolate Reductase 677TT Genotype. *J Nutr*. 138 :67-72
- Guinotte et al. (2003). Methylenetetrahydrofolate Reductase 677C T Variant Modulates Folate Status Response to Controlled Folate Intakes in Young Women. *J Nutr*. 133 :1272-1280
- Tanaka et al. (2009). Genome-wide association study of vitamin B6, vitamin B12, folate, and homocysteine blood concentrations. *Am J Hum Genet* 84(4): 477-482
- Thuesen et al. (2010). Lifestyle and genetic determinants of folate and vitamin B12 levels in a general adult population. *Br J Nutr* 103(8): 1195-1204
- Wang et al. (2010). Common genetic determinants of vitamin D insufficiency: a genome-wide association study. *Lancet* 376(9736): 180-188
- Wang et al. (2015). Predicting Hyperhomocysteinemia by Methylenetetrahydrofolate Reductase C677T Polymorphism in Chinese Patients With Hypertension. *Clin Appl Thromb Hemost*. 21(7):661-666
- 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
- Zhang et al. (2012). The GC, CYP2R1 and DHCR7 genes are associated with vitamin D levels in northeastern Han Chinese children. *Swiss Med Wkly* 142: w13636

Minerals

- Barlassina et al. (2007). Common genetic variants and haplotypes in renal CLCNKA gene are associated to salt-sensitive hypertension. *Hum Mol Genet* 16(13): 1630-1638
- Benyamin et al. (2009). Variants in TF and HFE explain approximately 40% of genetic variation in serum-transferrin levels. *Am J Hum Genet* 84(1): 60-65
- Evans et al. (2013). Genome-wide association study identifies loci affecting blood copper, selenium and zinc. *Hum Mol Genet*. 22(19): 3998-3400
- Gan et al. (2012). Association of TMPRSS6 polymorphisms with ferritin, hemoglobin, and type 2 diabetes risk in a Chinese Han population. *Am J Clin Nutr* 95(3): 626-632
- Gu et al. (2010). Genetic variants in the renin-angiotensin-aldosterone system and salt sensitivity of blood pressure. *J Hypertens* 28(6): 1210-1220
- Li et al. (2014). The relationship between angiotensinogen gene polymorphisms and essential hypertension in a Northern Han Chinese population. *Angiology* 65(7): 614-619
- Lian et al. (2013). Meta-analyses of HFE variants in coronary heart disease. *Gene* 527(1): 167-173
- Newhouse et al. (2009) . Polymorphisms in the WNK1 gene are associated with blood pressure variation and urinary potassium excretion. *PLoS One* 4(4): e5003
- Norat et al. (2008). Blood pressure and interactions between the angiotensin polymorphism AGT M235T and sodium intake: a cross-sectional population study. *Am J Clin Nutr* 88(2): 392-397
- Tanaka et al. (2010). A genome-wide association analysis of serum iron concentrations. *Blood* 115(1): 94-96

Bone density

- Estrada et al. (2012). Genome-wide meta-analysis identifies 56 bone mineral density loci and reveals 14 loci associated with risk of fracture. *Nat Genet* 44(5): 491-501
- Grant et al. (1996). Reduced bone density and osteoporosis associated with a polymorphic Sp1 binding site in the collagen type I alpha 1 gene. *Nat Genet* 14(2): 203-205
- Guillem et al. (2012). Refining perception-based farmer typologies with the analysis of past census data. *J Environ Manage* 110: 226-235
- Keen et al. (1999). Association of polymorphism at the type I collagen (COL1A1) locus with reduced bone mineral density, increased fracture risk, and increased collagen turnover. *Arthritis Rheum* 42(2): 285-290
- Liu et al. (2010). Analysis of recently identified osteoporosis susceptibility genes in Han Chinese women. *J Clin Endocrinol Metab* 95(9): E112-120
- Mann et al. (2001). A COL1A1 Sp1 binding site polymorphism predisposes to osteoporotic fracture by affecting bone density and quality. *J Clin Invest* 107(7): 899-907
- Richards et al. (2008). Bone mineral density, osteoporosis, and osteoporotic fractures: a genome-wide association study. *Lancet* 371(9623): 1505-1512
- Richards et al. (2012). Genetics of osteoporosis from genome-wide association studies: advances and challenges. *Nat Rev Genet* 13(8):576-588
- Rivadeneira et al. (2009). Twenty bone-mineral-density loci identified by large-scale meta-analysis of genome-wide association studies. *Nat Genet* 41(11): 1199-1206

SCIENTIFIC SOURCES

- Zhang et al. (2014). Multistage genome-wide association meta-analyses identified two new loci for bone mineral density. *Hum Mol Genet* 23(7): 1923-1933 (PMID: 24249740)
- Zhang et al. (2014). Relation of JAGGED 1 and collagen type 1 alpha 1 polymorphisms with bone mineral density in Chinese postmenopausal women. *Int J Clin Exp Pathol* 7(10): 7142-7147

Sweet treats intake

- Mäestu et al. (2007). Human adrenergic alpha 2A receptor C-1291G polymorphism leads to higher consumption of sweet food products. *Mol Psychiatry* 12(6): 520-521

Satiety and hunger

- Bouchard et al. (2004). Neuromedin beta: a strong candidate gene linking eating behaviors and susceptibility to obesity. *Am J Clin Nutr* 80(6): 1478-1486
- Frayling et al. (2007). A common variant in the FTO gene is associated with body mass index and predisposes to childhood and adult obesity. *Science* 316(5826): 889-894
- Wardle et al. (2008). Obesity associated genetic variation in FTO is associated with diminished satiety. *J Clin Endocrinol Metab.* 93(9):3640-3643

Perception of sweet taste

- Eny et al. (2008). Genetic variant in the glucose transporter type 2 is associated with higher intakes of sugars in two distinct populations. *Physiol Genomics* 33(3): 355-360

Perception of bitter taste

- Desai et al. (2011). Validation of edible taste strips for identifying PROP taste recognition thresholds. *Laryngoscope* 12(6): 1177-1183
- Ledda et al. (2014). GWAS of human bitter taste perception identifies new loci and reveals additional complexity of bitter taste genetics. *Hum Mol Genet* 23(1): 259-267
- Timpson et al. (2007). Refining associations between TAS2R38 diplotypes and the 6-n-propylthiouracil (PROP) taste test: findings from the Avon Longitudinal Study of Parents and Children. *BMC Genet* 8: 51

Alcohol metabolism

- Chen et al. (2009). Polymorphism of ethanol-metabolism genes and alcoholism: correlation of allelic variations with the pharmacokinetic and pharmacodynamic consequences. *Chem Biol Interact* 178(1-3): 2-7
- Martínez et al. (2010). Variability in ethanol biodisposition in whites is modulated by polymorphisms in the ADH1B and ADH1C genes. *Hepatology* 51(2): 491-500
- Matsuo et al. (2006). Alcohol dehydrogenase 2 His47Arg polymorphism influences drinking habit independently of aldehyde dehydrogenase 2 Glu487Lys polymorphism: analysis of 2,299 Japanese subjects. *Cancer Epidemiol Biomarkers Prev* 15(5): 1009-1013
- Yokoyama et al. (2005). Hangover susceptibility in relation to aldehyde dehydrogenase-2 genotype, alcohol flushing, and mean corpuscular volume in Japanese workers. *Alcohol Clin Exp Res* 29(7): 1165-1171

Caffeine metabolism

- Cornelis et al. (2006). Coffee, CYP1A2 genotype, and risk of myocardial infarction. *JAMA* 295(10): 1135-1141
- Palatini et al. (2009). CYP1A2 genotype modifies the association between coffee intake and the risk of hypertension. *J Hypertens* 27(8): 1594-1601
- Sachse et al. (1999). Functional significance of a C-->A polymorphism in intron 1 of the cytochrome P450 CYP1A2 gene tested with caffeine. *Br J Clin Pharmacol.* 47(4):445-449

Lactose intolerance

- Bersaglieri et al. (2004). Genetic signatures of strong recent positive selection at the lactase gene. *Am J Hum Genet* 74(6): 1111-1120
- Enattah et al. (2002). Identification of a variant associated with adult-type hypolactasia. *Nat Genet* 30(2): 233-237
- Heyer et al. (2011). Lactase persistence in central Asia: phenotype, genotype, and evolution. *Hum Biol* 83(3): 379-392
- Kerber et al. (2007). Hydrogen breath testing versus LCT genotyping for the diagnosis of lactose intolerance: a matter of age? *Clin Chim Acta* 383(1-2): 91-96
- Krawczyk et al. (2008). Concordance of genetic and breath tests for lactose intolerance in a tertiary referral centre. *J Gastrointestin Liver Dis* 17(2): 135-139
- Nagy et al. (2009). Prevalence of adult-type hypolactasia as diagnosed with genetic and lactose hydrogen breath tests in Hungarians. *Eur J Clin Nutr* 63(7): 909-912

SCIENTIFIC SOURCES

Gluten intolerance

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

Nicotine addiction

- Chen et al. (2012). Smoking and genetic risk variation across populations of European, Asian, and African American ancestry—a meta-analysis of chromosome 15q25. *Genet Epidemiol* 36(4): 340-351
- Haller et al. (2014). Rare missense variants in CHRN3 and CHRNA3 are associated with risk of alcohol and cocaine dependence. *Hum Mol Genet* 23(3): 810-819
- Liu et al. (2010). Meta-analysis and imputation refines the association of 15q25 with smoking quantity. *Nat Genet* 42(5): 436-440
- Thorgeirsson et al. (2008). A variant associated with nicotine dependence, lung cancer and peripheral arterial disease. *Nature* 452(7187): 638-642
- Thorgeirsson et al. (2010). Sequence variants at CHRN3-CHRNA6 and CYP2A6 affect smoking behavior. *Nat Genet* 42(5): 448-453

Alcohol addiction

- Bierut et al. (2010). A genome-wide association study of alcohol dependence. *Proc Natl Acad Sci USA* 107(11): 5082-5087
- Haller et al. (2012). Rare missense variants in CHRN4 are associated with reduced risk of nicotine dependence. *Hum Mol Genet* 21(3): 647-655
- Roh et al. (2011). Role of GABRA2 in moderating subjective responses to alcohol. *Alcohol Clin Exp Res* 35(3): 400-407
- Saccone et al. (2010). Multiple independent loci at chromosome 15q25.1 affect smoking quantity: a meta-analysis and comparison with lung cancer and COPD. *PLoS Genet* 6(8): e1001053
- Smith et al. (2008). Meta-analysis of the association of the Taq1A polymorphism with the risk of alcohol dependency: a HuGE gene-disease association review. *Am J Epidemiol* 167(2): 125-138
- Suraj Singh et al. (2013). DRD2 and ANKK1 gene polymorphisms and alcohol dependence: a case-control study among a Mendelian population of East Asian ancestry. *Alcohol Alcohol* 48(4): 409-414

Biological ageing

- Codd et al. (2010). Common variants near TERC are associated with mean telomere length. *Nat Genet* 42(3): 197-199
- Mangino et al. (2012). Genome-wide meta-analysis points to CTC1 and ZNF676 as genes regulating telomere homeostasis in humans. *Hum Mol Genet* 21(24): 5385-5394
- Soerensen et al. (2012). Genetic variation in TERT and TERC and human leukocyte telomere length and longevity: a cross-sectional and longitudinal analysis. *Aging Cell* 11(2): 223-227
- Shen et al. (2011). Common variants near TERC are associated with leukocyte telomere length in the Chinese Han population. *Eur J Hum Genet* 19(6): 721-723

Inflammation sensitivity

- Jianf et al. (2010). Interleukin-6 receptor gene polymorphism modulates interleukin-6 levels and the metabolic syndrome: GBCS-CVD. *Obesity (Silver Spring)* 18(10): 1969-1974
- Kardys et al. (2006). C-reactive protein gene haplotypes and risk of coronary heart disease: the Rotterdam Study. *Eur Heart J* 27(11): 1331-1337
- Mori and Beilin. (2004). Omega-3 Fatty Acids and Inflammation. *Curr Atheroscler Rep.* 6(6): 461-467
- Pai et al. (2008). C-Reactive Protein (CRP) Gene Polymorphisms, CRP Levels, and Risk of Incident Coronary Heart Disease in Two Nested Case-Control Studies. *PLoS One* 3(1): e1395
- Scheller et al. (2011). The pro- and anti-inflammatory properties of the cytokine interleukin-6. *Biochim Biophys Acta* 1813(5): 878-888.
- Simopoulos. (2002). Omega-3 Fatty Acids in Inflammation and Autoimmune Diseases. *J Am Coll Nutr* 21(6): 495-505
- Vargas et al. (2013). Influence of the 48867A>C (Asp358Ala) IL6R polymorphism on response to a lifestyle modification intervention in individuals with metabolic syndrome. *Genet Mol Res* 2(3): 3983-3991.
- Walston et al. (2010). Inflammation and stress-related candidate genes, plasma interleukin-6 levels, and longevity in older adults. *Exp Gerontol* 44(5): 350–355.
- Wypasek et al. (2015). Association of the C-Reactive Protein Gene (CRP) rs1205 C>T Polymorphism with Aortic Valve Calcification in Patients with Aortic Stenosis. *Int J Mol Sci* 16(10): 23745–2375

Sleep cycle

- Benedetti et al. (2007). Actimetric evidence that CLOCK 3111 T/C SNP influences sleep and activity patterns in patients affected by bipolar depression. *Am J Med Genet B Neuropsychiatr Genet* 144B(5): 631-635
- Katzenberg et al. (1998). A CLOCK polymorphism associated with human diurnal preference. *Sleep*. 21(6): 569-576
- Mishima et al. (2005). The 3111T/C polymorphism of hClock is associated with evening preference and delayed sleep timing in a Japanese population sample. *Am J Med Genet B Neuropsychiatr Genet* 133B(1): 101-104

Oxidative stress

- Hu in Diamond (2003). Role of glutathione peroxidase 1 in breast cancer: loss of heterozygosity and allelic differences in the response to selenium. *Cancer Res* 63(12): 3347-3351
- Moran et al. (1999). A potential mechanism underlying the increased susceptibility of individuals with a polymorphism in NAD(P)H:quinone oxidoreductase 1 (NQO1) to benzene toxicity. *Proc Natl Acad Sci U S A* 96(14): 8150-8155
- Nadif et al. (2005). Association of CAT polymorphisms with catalase activity and exposure to environmental oxidative stimuli. *Free Radic Res* 39(12): 1345-1350
- Perianayagam et al. (2007). NADPH oxidase p22phox and catalase gene variants are associated with biomarkers of oxidative stress and adverse outcomes in acute renal failure. *J Am Soc Nephrol* 18(1): 255-263
- Ratnasinghe et al. (2000). Glutathione peroxidase codon 198 polymorphism variant increases lung cancer risk. *Cancer Res* 60(22): 6381-6383
- Ross (2005). Functions and distribution of NQO1 in human bone marrow: potential clues to benzene toxicity. *Chem Biol Interact* 153-154: 137-146
- Saldivar et al. (2005). An association between a NQO1 genetic polymorphism and risk of lung cancer. *Mutat Res*. 582(1-2): 71-78
- Siegel et al. (1999). Genotype-phenotype relationships in studies of a polymorphism in NAD(P)H:quinone oxidoreductase 1. *Pharmacogenetics* 9(1): 113-121
- Smith (1999). Benzene, NQO1, and genetic susceptibility to cancer. *Proc Natl Acad Sci U S A* 96(14): 7624-7626
- Zhao et al. (2012). Genetic oxidative stress variants and glioma risk in a Chinese population: a hospital-based case-control study. *BMC Cancer* 12: 617

Vitamin E

- Ferrucci et al. (2009). Common variation in the beta-carotene 15,15' monooxygenase 1 gene affects circulating levels of carotenoids: a genome-wide association study. *Am J Hum Genet* 84(2):123-33
- Major et al. (2011). Genome-wide association study identifies common variants associated with circulating vitamin E levels. *Hum Mol Genet* 20(19): 3876-3883
- Major et al. (2012). Genome-wide association study identifies three common variants associated with serologic response to vitamin E supplementation in men. *J Nutr* 142(5): 866-871

Selenium

- Méplan et al. (2007). Genetic polymorphisms in the human selenoprotein P gene determine the response of selenoprotein markers to selenium supplementation in a gender-specific manner (the SELGEN study). *FASEB J* 21(12): 3063-3074
- Xia et al. (2010). Optimization of selenoprotein P and other plasma selenium biomarkers for the assessment of the selenium nutritional requirement: a placebo-controlled, double-blind study of selenomethionine supplementation in selenium-deficient Chinese subjects. *Am J Clin Nutr* 92(3): 525-531
- Xiong et al. (2010). Association study between polymorphisms in selenoprotein genes and susceptibility to Kashin-Beck disease. *Osteoarthritis Cartilage* 18(6): 817-824

Vitamin C

- Timpson et al. (2010). Genetic variation at the SLC23A1 locus is associated with circulating concentrations of L-ascorbic acid (vitamin C): evidence from 5 independent studies with >15,000 participants. *Am J Clin Nutr*. 92(2):375-382

Muscle structure

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

Strength training

- Orkunoglu-Suer et al. (2008). INSIG2 gene polymorphism is associated with increased subcutaneous fat in women and poor response to resistance training in men. *BMC Med Genet* 9:117

VO2max (Your aerobic potential)

- Ahmetov et al. (2009). The combined impact of metabolic gene polymorphisms on elite endurance athlete status and related phenotypes. *Hum Genet.* 126(6):751-761
- Defoor et al. (2006). The CAREGENE study: ACE gene I/D polymorphism and effect of physical training on aerobic power in coronary artery disease. *Heart.* 92(4):527-528
- Hagberg et al. (1998). VO2 max is associated with ACE genotype in postmenopausal women. *J Appl Physiol.* 85(5):1842-1846
- Hagberg et al. (2002). ACE insertion/deletion polymorphism and submaximal exercise hemodynamics in postmenopausal women. *J Appl Physiol.* 92(3):1083-1088
- Hennis et al. (2015). Genetic factors associated with exercise performance in atmospheric hypoxia. *Sports Med.* 2015 May;45(5):745-61. doi: 10.1007/s40279-015-0309-8.
- Lucia et al. (2005). PPARGC1A genotype (Gly482Ser) predicts exceptional endurance capacity in European men. *J Appl Physiol* (1985). 99(1):344-348
- Maciejewska et al. (2012). The PPARGC1A gene Gly482Ser in Polish and Russian athletes. *J Sports Sci.* 30(1):101-113
- Masschelein et al. (2015). A genetic predisposition score associates with reduced aerobic capacity in response to acute normobaric hypoxia in lowlanders. *High Alt Med Biol.* 16(1):34-42
- Patel et al. (2003). Angiotensin-converting enzyme genotype and the ventilatory response to exertional hypoxia. *Eur Respir J.* 22(5):755-60.
- Sarpeshkar et al. (2010). Adrenergic-beta(2) receptor polymorphism and athletic performance. *J Hum Genet.* 55(8):479-485
- Stefan et al. (2007). Genetic variations in PPARGC1A determine mitochondrial function and change in aerobic physical fitness and insulin sensitivity during lifestyle intervention. *J Clin Endocrinol Metab.* 92(5):1827-1833
- Tsianos et al. (2010). Associations of polymorphisms of eight muscle- or metabolism-related genes with performance in Mount Olympus marathon runners. *J Appl Physiol.* 108(3):567-574

Post-exercise recovery

- Bastaki et al. (2006). Genotype-activity relationship for Mn-superoxide dismutase, glutathione peroxidase 1 and catalase in humans. *Pharmacogenet Genomics.* 16(4):279-286
- Caple et al. (2010). Inter-individual variation in DNA damage and base excision repair in young, healthy non-smokers: effects of dietary supplementation and genotype. *Br J Nutr.* 103(11):1585-1593
- D'souza et al. (2008). Detection of catalase as a major protein target of the lipid peroxidation product 4-HNE and the lack of its genetic association as a risk factor in SLE. *BMC Med Genet.* 9:62.
- Forsberg et al. (2001). A common functional C-T substitution polymorphism in the promoter region of the human catalase gene influences transcription factor binding, reporter gene transcription and is correlated to blood catalase levels. *Free Radic Biol Med.* 30(5):500-505
- Mohammadi et al. (2014). Manganese superoxide dismutase (SOD2) polymorphisms, plasma advanced oxidation protein products (AOPP) concentration and risk of kidney complications in subjects with type 1 diabetes. *PLoS One.* 9(5):e96916.
- Nadif et al. (2005). Association of CAT polymorphisms with catalase activity and exposure to environmental oxidative stimuli. *Free Radic Res.* 39(12):1345-1350
- Najafi et al. (2012). Phenotype and genotype relationship of glutathione peroxidase1 (GPx1) and rs 1800668 variant: the homozygote effect on kinetic parameters. *Gene.* 505(1):19-22
- Perianayagam et al. (2007). NADPH oxidase p22phox and catalase gene variants are associated with biomarkers of oxidative stress and adverse outcomes in acute renal failure. *J Am Soc Nephrol.* 18(1):255-263
- Ross et al. (2000). NAD(P)H:quinone oxidoreductase 1 (NQO1): chemoprotection, bioactivation, gene regulation and genetic polymorphisms. *Chem Biol Interact.* 129(1-2):77-97

Inflammation

- Jianf et al. (2010). Interleukin-6 receptor gene polymorphism modulates interleukin-6 levels and the metabolic syndrome: GBCS-CVD. *Obesity (Silver Spring)* 18(10): 1969-1974
- Kardys et al. (2006). C-reactive protein gene haplotypes and risk of coronary heart disease: the Rotterdam Study. *Eur Heart J* 27(11): 1331-1337
- Mori and Beilin. (2004). Omega-3 Fatty Acids and Inflammation. *Curr Atheroscler Rep.* 6(6): 461-467
- Pai et al. (2008). C-Reactive Protein (CRP) Gene Polymorphisms, CRP Levels, and Risk of Incident Coronary Heart Disease in Two Nested Case-Control Studies. *PLoS*

SCIENTIFIC SOURCES

One 3(1): e1395

- Scheller et al. (2011). The pro- and anti-inflammatory properties of the cytokine interleukin-6. *Biochim Biophys Acta* 1813(5): 878-888.
- Simopoulos. (2002). Omega-3 Fatty Acids in Inflammation and Autoimmune Diseases. *J Am Coll Nutr* 21(6): 495-505
- Vargas et al. (2013). Influence of the 48867A>C (Asp358Ala) IL6R polymorphism on response to a lifestyle modification intervention in individuals with metabolic syndrome. *Genet Mol Res* 2(3): 3983-3991
- Walston et al. (2010). Inflammation and stress-related candidate genes, plasma interleukin-6 levels, and longevity in older adults. *Exp Gerontol* 44(5): 350–355
- Wypasek et al. (2015). Association of the C-Reactive Protein Gene (CRP) rs1205 C>T Polymorphism with Aortic Valve Calcification in Patients with Aortic Stenosis. *Int J Mol Sci* 16(10): 23745–23759

Heart capacity

- Hagberg et al. (2002). ACE insertion/deletion polymorphism and submaximal exercise hemodynamics in postmenopausal women. *J Appl Physiol* (1985). 2002 Mar;92(3):1083-1088
- Rankinen et al. (2010). CREB1 is a strong genetic predictor of the variation in exercise heart rate response to regular exercise: the HERITAGE Family Study. *Circ Cardiovasc Genet*. 3(3):294-299

Muscle volume gene

- Nielsen et al. (2007). Expression of interleukin-15 in human skeletal muscle effect of exercise and muscle fibre type composition. *J Physiol*. 584(Pt 1):305-12
- Pistilli et al. (2008). Interleukin-15 and interleukin-15R alpha SNPs and associations with muscle, bone, and predictors of the metabolic syndrome. *Cytokine*. 43(1):45-53
- Riechman et al. (2004). Association of interleukin-15 protein and interleukin-15 receptor genetic variation with resistance exercise training responses. *J Appl Physiol* (1985). 97(6):2214-2219

Warrior gene

- Zubieta et al. (2003). COMT val158met genotype affects mu-opioid neurotransmitter responses to a pain stressor. *Science*. 299(5610):1240-1243
- Mitaki et al. (2013). Impact of five SNPs in dopamine-related genes on executive function. *Acta Neurol Scand*. 127(1):70-76
- Stein et al. (2006). Warriors versus worriers: the role of COMT gene variants. *CNS Spectr*. 11(10):745-748

Lean body mass

- Liu et al. (2009). Genome-wide association and replication studies identified TRHR as an important gene for lean body mass. *Am J Hum Genet*. 84(3):418-423

Gene for muscle fatigue

- Cupeiro et al. (2010). MCT1 genetic polymorphism influence in high intensity circuit training: a pilot study. *J Sci Med Sport*. 13(5): 526-530
- Fetodovskaya et al. (2014). A common polymorphism of the MCT1 gene and athletic performance. *Int J Sports Physiol Perform*. 9(1): 173-180
- Sawczuk et al. (2015). MCT1 A1470T: a novel polymorphism for sprint performance? *J Sci Med Sport*. 18(1): 114-118

HDL (good) cholesterol, LDL (bad) cholesterol and Triglycerides

- Chasman et al. (2009). Forty-three loci associated with plasma lipoprotein size, concentration, and cholesterol content in genome-wide analysis. *PLoS Genet* 5(11): e1000730
- Do et al. (2013). Common variants associated with plasma triglycerides and risk for coronary artery disease. *Nat Genet* 45(11): 1345-1352
- 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
- Lange et al. (2014). Whole-exome sequencing identifies rare and low-frequency coding variants associated with LDL cholesterol. *Am J Hum Genet* 94(2):233-245
- Teslovich et al. (2010). Biological, clinical and population relevance of 95 loci for blood lipids. *Nature* 466(7307): 707-713
- Tukiainen et al. (2012). Detailed metabolic and genetic characterization reveals new associations for 30 known lipid loci. *Hum Mol Genet* 21(6): 1444-1455

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
- Hu et al. (2009). PPARG, KCNJ11, CDKAL1, CDKN2A-CDKN2B, IDE-KIF11-HHEX, IGF2BP2 and SLC30A8 are associated with type 2 diabetes in a Chinese population. *PLoS One* 4(10): e7643

SCIENTIFIC SOURCES

- Pang et al. (2013). Functional analysis of TCF7L2 genetic variants associated with type 2 diabetes. *Nutr Metab Cardiovasc Dis.* 23(6):550-6.
- Wu et al. (2008). Common variants in CDKAL1, CDKN2A/B, IGF2BP2, SLC30A8, and HHEX/IDE genes are associated with type 2 diabetes and impaired fasting glucose in a Chinese Han population. *Diabetes* 57(10): 2834-2842
- Xiang et al. (2008). Zinc transporter-8 gene (SLC30A8) is associated with type 2 diabetes in Chinese. *J Clin Endocrinol Metab* 93(10): 4107-4112

Omega-3 metabolism

- Ferguson J et al. (2010). NOS3 gene polymorphisms are associated with risk markers of cardiovascular disease, and interact with omega-3 polyunsaturated fatty acids. *Atherosclerosis.* 211:539-544.
- Harsløf et al. (2013). FADS genotype and diet are important determinants of DHA status: a cross-sectional study in Danish infants. *Am J Clin Nutr* 97(6): 1403-10
- Lemaitre et al. (2011). Genetic loci associated with plasma phospholipid n-3 fatty acids: a meta-analysis of genome-wide association studies from the CHARGE Consortium. *PLoS Genet* 7(7): e1002193

Omega-3 and triglycerides

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

Insulin sensitivity

- Heni et al. (2010). Association of obesity risk SNPs in PCSK1 with insulin sensitivity and proinsulin conversion. *BMC Med Genet.* 11:86
- Goyenechea et al. (2009). The -11391 G/A polymorphism of the adiponectin gene promoter is associated with metabolic syndrome traits and the outcome of an energy-restricted diet in obese subjects. *Horm Metab Res.* 41(1):55-61
- Palmer et al. (2008). Association of TCF7L2 gene polymorphisms with reduced acute insulin response in Hispanic Americans. *J Clin Endocrinol Metab.* 93(1): 304-309

Adiponectin

- Nigro et al. (2014). New insight into adiponectin role in obesity and obesity-related diseases. *Biomed Res Int* 2014: 658913.
- Hivert et al. (2008). Common variants in the adiponectin gene (ADIPOQ) associated with plasma adiponectin levels, type 2 diabetes, and diabetes-related quantitative traits: the Framingham Offspring Study. *Diabetes* 57(12): 3353-3359
- Yoon et al. (2006). Adiponectin increases fatty acid oxidation in skeletal muscle cells by sequential activation of AMP-activated protein kinase, p38 mitogen-activated protein kinase, and peroxisome proliferator-activated receptor α . *Diabetes* 55(9): 2562-2570

C-reactive protein (CRP)

- Arguinano et al. (2017). IL6R haplotype rs4845625*T/rs4537545*C is a risk factor for simultaneously high CRP, LDL and ApoB levels. *Genes Immun.* 18(3):163-169
- Eiriksdottir et al. (2009). The interaction of adiposity with the CRP genes affects CRP levels: age, gene/environmentsusceptibility-Reykjavik study. *Int J Obes.* 33(2):267-272
- Naitza et al. 2012. A Genome-Wide Association Scan on the Levels of Markers of Inflammation in Sardinians Reveals Associations That Underpin Its Complex Regulation. *PLoS Genet.* 8(1):e1002480
- Reiner et al. (2008). Polymorphisms of the HNF1A Gene Encoding Hepatocyte Nuclear Factor-1 α are Associated with C-Reactive Protein. *Am J Hum Genet.* 82(5): 1193-1201

Skin antioxidant capacity

- Fischer et al. (2011). Association between genetic variants in the Coenzyme Q10 metabolism and Coenzyme Q10 status in humans. *BMC Res Notes.* 4: 245
- Naval et al. (2014). Genetic polymorphisms and skin aging: the identification of population genotypic groups holds potential for personalized treatments. *Clin Cosmet Invest Dermatol.* 7:207-214

Glycation protection

- Gkogkolou and Böhm (2012). Advanced glycation end products: Key players in skin aging? *Dermato-Endocrinol* 4(3): 259-270
- Leslie et al. (2003). Level of an advanced glycated end product is genetically determined: a study of normal twins. *Diabetes* 52(9): 2441-2444
- Peculis et al. (2013). Identification of glyoxalase 1 polymorphisms associated with enzyme activity. *Gene* 515(1): 140-143

Cellulite

- Emanuele et al. (2010). A multilocus candidate approach identifies ACE and HIF1A as susceptibility genes for cellulite. *JEADV* 24: 930-935

Skin hydration

- Naval et al. (2014). Genetic polymorphisms and skin aging: the identification of population genotypic groups holds potential for personalized treatments. *Clin Cosmet Invest Dermatol*. 7:207-214

Skin elasticity

- Le Clerc et al. (2013). A Genome-Wide Association Study in Caucasian Women Points Out a Putative Role of the STXBP5L Gene in Facial Photoaging. *J Invest Dermatol*. 133(4):929-935
- Naval et al. (2014). Genetic polymorphisms and skin aging: the identification of population genotypic groups holds potential for personalized treatments. *Clin Cosmet Invest Dermatol*. 7:207-214
- Vierkötter et al. (2015). MMP-1 and -3 Promoter Variants Are Indicative of a Common Susceptibility for Skin and Lung Aging: Results from a Cohort of Elderly Woman (SALIA). *J Invest Dermatol*. 135(5): 1268-1274

Stretch marks

- Tung et al. (2013). Genome-wide association analysis implicates elastic microfibrils in the development of nonsyndromic striae distensae. *J Invest Dermatol*. 133(11):2628-2631

