biomolmed laboratorium

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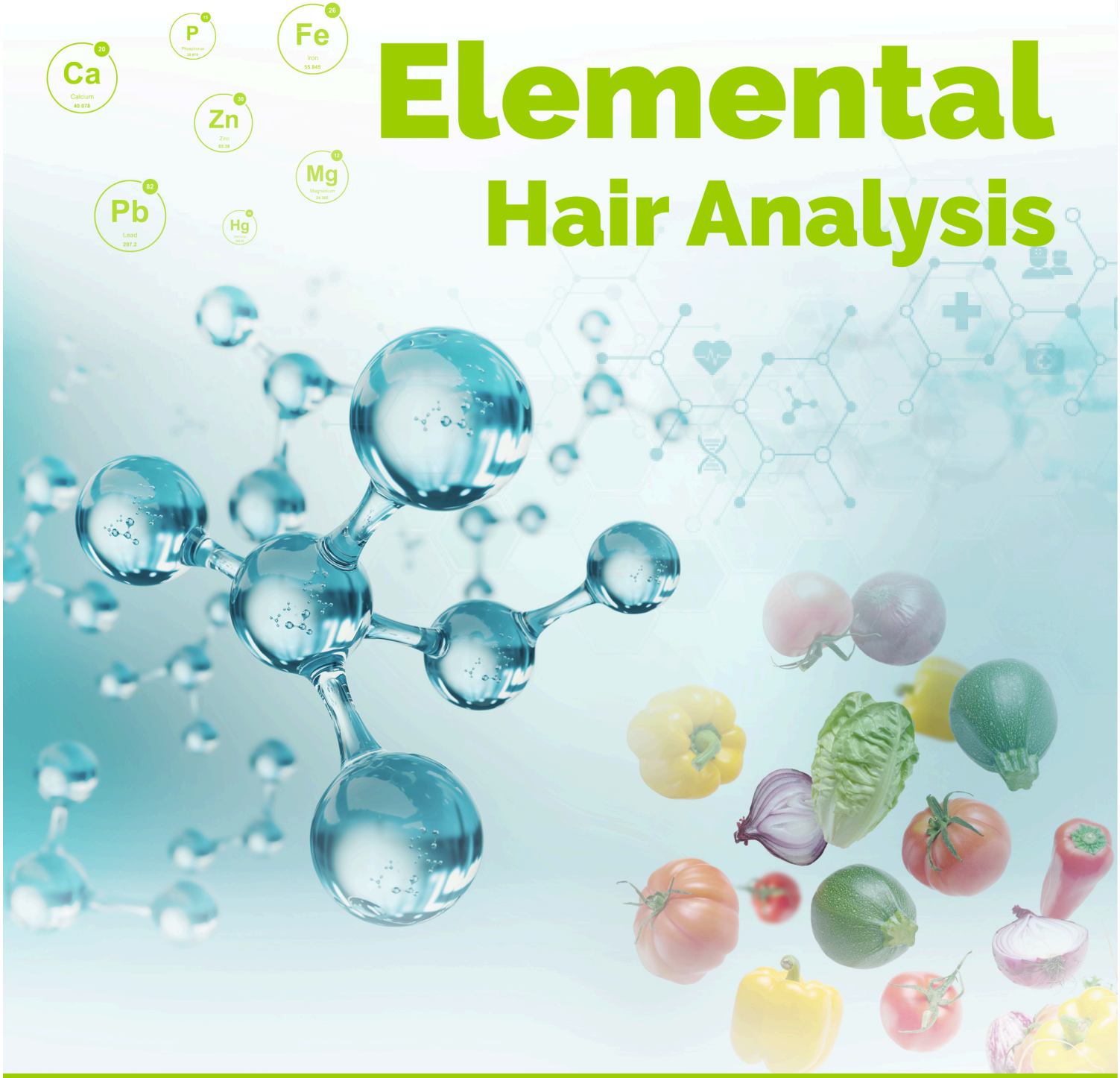
bsi. ISO 9001 Quality Management
FS 609038

Elemental
Hair Analysis



Health programme

Test report: EXAMPLE RESULT
The sample belongs to: EXAMPLE RESULT/span>
Test ordered by: EXAMPLE RESULT
The result has been issued in accordance with the PB-01 test procedure. from 01.02.2016


RZETELNA Firma

Dear Sirs,

In the Biomol-Med Sp. z o.o. Trace Elements Laboratory, we conduct quantitative analyses of elements contained in hair. On the basis of own research and available literature, we have established the standards of hair mineral composition for the Central European population. On the basis of data obtained from medical literature on mineral transformation from the last several years, we have defined dependencies among elements. The results of the analysis of elements in hair are interpreted by doctors cooperating with the Laboratory on the basis of the proportions among elements and their amounts.

The main objective of hair analysis is prophylactics. Supplements are not medicines and they do not replace medicines. Following a hair analysis, a patient must not independently alter the treatment prescribed by their doctor. The analysis of elements in hair is not used to detect diseases symptoms and cannot be utilised for tracing the treatment process. In case any medicaments are used, prior to introducing a nutrition programme resulting from the analysis of elements in hair, it is necessary to consult a doctor who has prescribed these medicaments. The attending physician takes the final decision on the applicable form of nutrition. Thanks to this result, it is possible to tailor a nutrition programme to individual patients' needs. In some cases, nutritional preparations may have adverse impact on one's physical well-being. In such situations, a visit at attending physician's must be scheduled. Deterioration of physical well-being may result from the processes of body "detoxification". Toxic elements and catabolites collected in tissues which are removed from the body are the direct reason for this. Thus person's well-being should soon be back to normal. During this time, the dose of the suggested nutritional preparations may be halved for a few days. Numerous doctors from different specualisations cooperate with our laboratory. The examination results and our interpretation of the mineral transformation constitute handy diagnostic tools enabling them to more precisely pinpoint the reasons for some metabolic disorders. A doctor takes the final decision regarding the correct nutrition for an examined person.

Management Board,
Biomol-Med Sp. z o.o.

1. Introduction

The mineral metabolism test results you receive are complementary to biochemical analyses. Elemental analysis, in combination with medical interview or examination, is a valuable source of information that helps to fully assess the patient's health condition and identify the characteristics of the metabolic type. The rate of metabolism may be affected by a variety of external factors, e.g. physical or mental work, emotional states, low or high ambient temperature, food digestion and absorption, increased levels of certain hormones in blood, especially thyroid gland and adrenal medulla hormones. Appropriate analysis of medical interview (or patient questionnaire) and elemental test findings helps to identify the optimal organism nutrition.

If used in the description, such words as "increased" or "heightened", etc., should not be interpreted as indicative of a pathology, but rather as a reflection of the metabolic processes status. Correct concentrations of elements and proportions between them may only be treated as one of the parameters defining a deficit or surplus of the given element. Mineral metabolism tests have been applied for 30 years by many research centres around the world.

Mineral metabolism test results may:

- show vulnerability to certain diseases
- support therapeutic interventions
- explain the disorders accompanying a number of pathologies.

Based on the test results, we give you individual dietary recommendations and supplementation scheme (vitamins-minerals-antioxidation), with a view to improving your health condition..

2. The basis of hair analysis result interpretation

The human organism is a biochemical factory, where production is going on continually. In each cell, catabolic

processes (combustion) take place, generating energy indispensable to maintain all physiological functions of the organism

The equilibrium between catabolism and anabolism is referred to as metabolism. Within one year, an adult consumes over 1 ton of food, containing ca. 70% of water. The food contains carbohydrates, fats and proteins. Carbohydrates and fats are the basic sources of energy generated as a result of catabolic processes. Protein in the basic source of material utilized in regeneration of our organism in anabolic processes.

In the whole organism, only the nervous and muscular systems remain unchanged throughout our life. All other tissues are "exchanged". Depending on the metabolic rate, new generations of cells may develop every few days, weeks, or months. The quality of the regenerated tissues is dependent on genetic and external factors, and first of all on the nutritional pattern. The efficiency of regeneration of our internal organs determines the aging rate of our organism. As genetic information is more and more deteriorated in the next generations of cells (because of the lack of enzyme; telomerase, the new cells receive shortened chromosomes) our life span is limited. If the function of all our internal organs remains optimal, we could age as long as our brain and nervous system is able to live – i.e. 110 -130 years. We cannot influence directly the genetics yet, but we can counteract the potential hazards with an appropriate diet. On the other hand, an inappropriate diet may influence our genetics, e.g. by free radical mechanisms. Incorrect nutrition impairs the function of the antioxidative barrier, thus accelerating aging due to free radical reactions. Each organism of a particular species has strictly defined characteristics, which determine its functions. Within the same species, there are significant physiological and anatomical differences. They are determined by different environmental and genetic factors. As a result, each organism is a biochemical individuality with distinct nutritional needs.

How can one's own biochemical individuality be defined and determined?
How can we assess objectively our individual metabolic needs?

The search for a definition systematizing the variety of the human race has been going on for ages. The starting point was always the specific mode of biochemical energy utilization at the physical and emotional level. Recent studies point to the activity of the particular endocrine glands (thyroid and adrenals).On that basis, the following metabolic types can be distinguished.

adrenalin type

a sturdy person with athletic figure, serene, patient, sympathetic; requires physical activity, enhancing oxygenation of the organism, to remain healthy; a person who likes dominating others; high-protein diet and three meals a day are the best for this type; gaining weight, such a person develops abdominal obesity which can affect significantly the lipid profile (calcium metabolism predominates in the organism)

thyroid type

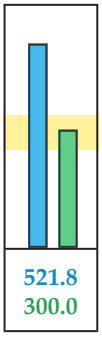
a quick-acting person, energetic, impatient, enjoying intensive activity, which often leads to exhaustion and discouragement, to regain the top form with time and be able to work hard again; owing to quick combustion processes, such a person can eat a lot, remaining slim and fit; functions well eating even once a day; high intensity of life often leads to disturbances in thyroid function; if such a person gains weight, losing excess kilograms is difficult (phosphorus metabolism predominates in the organism).

pituitary type

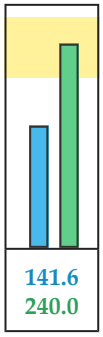
a person thin and slim, indifferent to the needs of the organism; an intellectual type, with predominance of logical thinking; alternating periods of occupational activity or reluctance to work and depression; vegetarian diet and a few, i.e. 5-6 small means a day are good for this type; a person susceptible to addiction to all stimulants (sulfur metabolism predominates in the organism).

3. Elemental hair test results

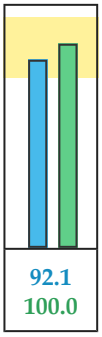
Elements



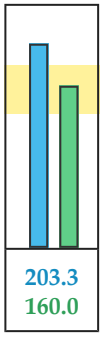
Ca (calcium)
+ 74 %



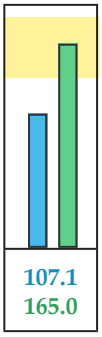
Na (sodium)
- 41 %



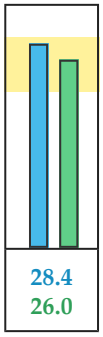
K (potassium)
- 8 %



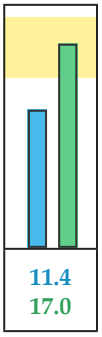
P (phosphorus)
+ 27 %



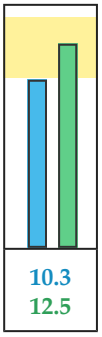
Zn (zinc)
- 35 %



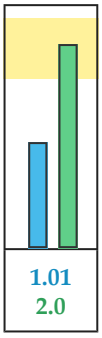
Mg (magnesium)
+ 9 %



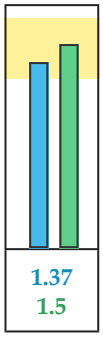
Fe (iron)
- 33 %



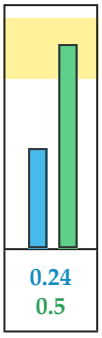
Cu (copper)
- 18 %



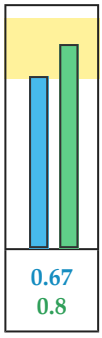
Ni (nickiel)
- 49 %



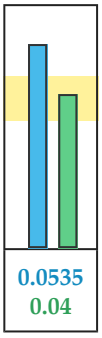
Mn (manganese)
- 9 %



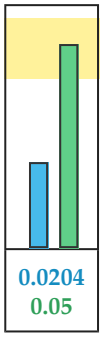
Se (selenium)
- 52 %



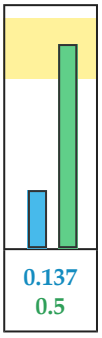
Cr (chromium)
- 16 %



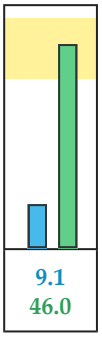
Mo (molybdenum)
+ 34 %



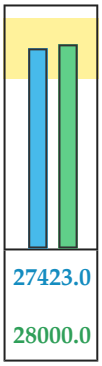
Co (cobalt)
- 59 %



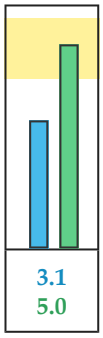
Ag (silver)
- 73 %



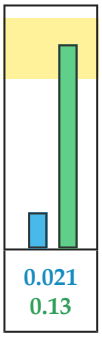
Si (silicon)
- 80 %



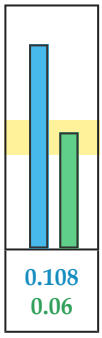
S (sulfur)
- 2 %



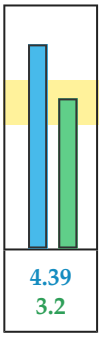
I (iodine)
- 38 %



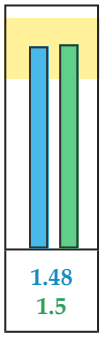
Sn (tin)
- 84 %



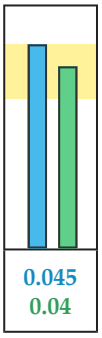
V (vanadium)
+ 80 %



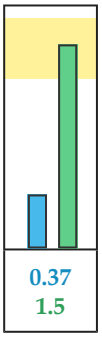
Sr (strontium)
+ 37 %



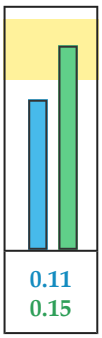
B (boron)
- 1 %



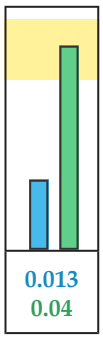
Li (lithium)
+ 13 %



Ba (barium)
- 75 %



Au (gold)
- 27 %

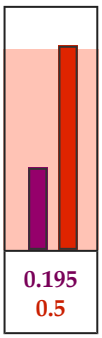


Ge (germanium)
- 67 %

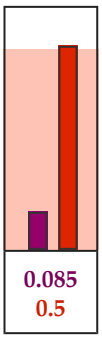
Reference names (Values in ppm - mg of a given element /1 kg of hair)

- test value
- correct value
- reference range of an element
- tested value of a toxic element
- maximum value of a toxic element
- reference value of a toxic element

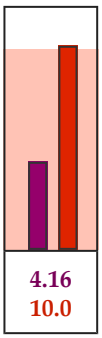
Toxic elements



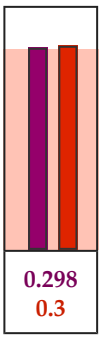
As(arsenium)



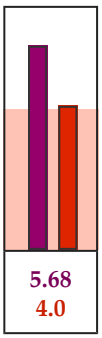
Hg(mercury)



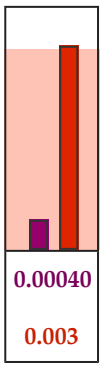
Al(aluminium)



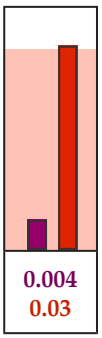
Cd(cadmium)



Pb(lead)

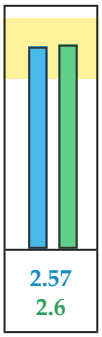


Tl(thallium)

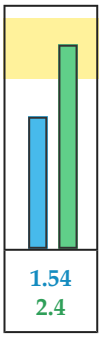


Be(beryllium)

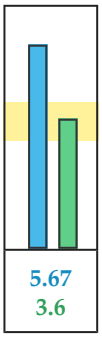
Proportions between elements



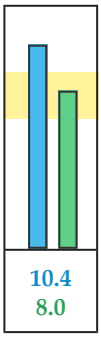
Ca/P
- 1 %



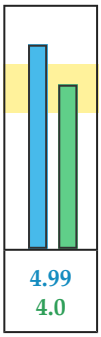
Na/K
- 36 %



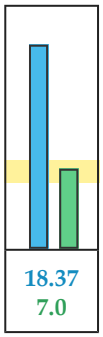
Ca/K
+ 58 %



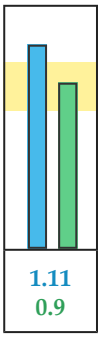
Zn/Cu
+ 30 %



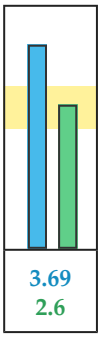
Na/Mg
+ 25 %



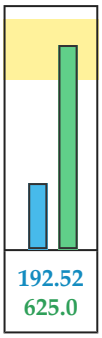
Ca/Mg
+ 162 %



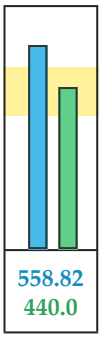
Fe/Cu
+ 23 %



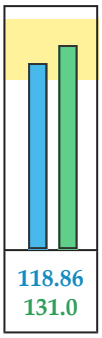
Ca/Na
+ 42 %



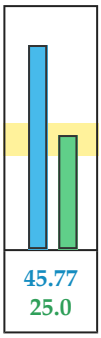
Cu/Mo
- 69 %



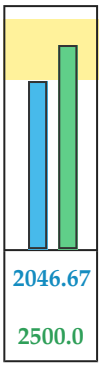
Fe/Co
+ 27 %



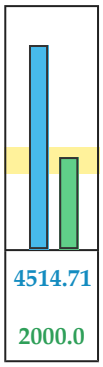
Ca/Sr
- 9 %



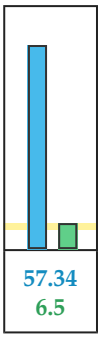
Ca/Fe
+ 83 %



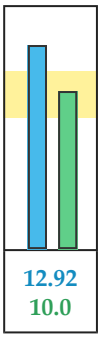
K/Li
- 18 %



K/Co
+ 126 %

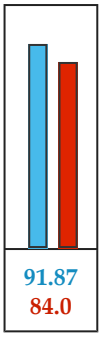


Ca/Si
+ 782 %

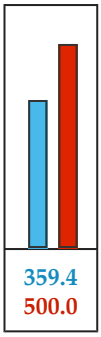


I/Se
+ 29 %

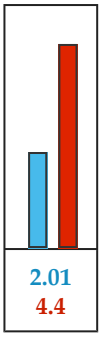
Toxic Proportions



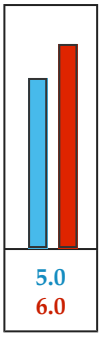
Ca/Pb
Correct



Zn/Cd
Incorrect



Fe/Pb
Incorrect



Mg/Pb
Incorrect

Reference names (Values in ppm - mg of a given element /1 kg of hair)

test value

correct value

reference range of an element

Sample test result authorised by:

Date of sample delivery: Feb. Test date: 2026-02-10. Authorisation date: 2026-02-10.

We hereby represent that the result is based on the sample which we received on Feb.

Chemical element analysis was performed on the Perkin Elmer ICP Optima 7300 DV and ICP MS DRC2

Uncertainty of test was based according to EA-4/16 domument.

Uncertainty values constitute uncertainties extended with certainty level of ca. 95% and coverage factor k=2.

4. Interpretation of the test result (the most important proportions between elements)

Na/K Low relation of sodium to potassium indicates increased catabolic activity, connected to increased secretion of glucocorticoids. Increased content of glucocorticoids in the organism affects, among others, the metabolism of proteins (catabolism - decomposition), and inhibits cellular immunity (immunosuppressive activity). At prolonged activity of stressing factor (continuous stress), increased activity of adrenal glands may follow. Increased secretion of glucocorticoids may lead to a number of disturbances such as depression, proteins metabolism abnormalities, or disturbances of immunological type.

Ca/K Thyroid exerts essential influence on the metabolism of calcium and potassium. If the proportion of calcium to potassium is abnormal (high value), it can indicate decreased activity of the thyroid (this does not necessarily mean hypothyroidism) - in case of significant thyroid abnormalities, necessity of additional investigations will be stated

Ca/Mg Magnesium regulates the activity of calcium, which stimulates muscles to contract. Correct proportion Ca/Mg determines normal muscular tone. Calcium and magnesium are essential elements for muscles contraction and relaxation. If proportion between calcium and magnesium is inappropriate, it leads to abnormally elevated muscle tome or, inversely, decreased tone. If this inappropriate proportion is maintained over a long period of time, it may lead to disturbances of the skeletal, alimentary and nervous systems. In your case the proportion Ca/Mg indicates increased muscle tone, which can manifest as frequent cramps, feeling of constant tension, disturbances of the digestive system (constipation); and may also cause transfer of calcium within the body (transmineralisation).Transmineralisation means translocation of calcium from areas of its high content to places of lower saturation with this element.

Cu/Mo Physiological activity of molybdenum depends on its interaction with other elements. In particularly, proper Cu/Mo proportion is important . As copper and molybdenum are antagonistic elements, excess of molybdenum can cause secondary deficit of copper. Low value of proportion of copper to molybdenum, even at high concentration of copper, can suggest disturbances of the processes of copper absorption.

Ca/Fe The proportion of calcium to iron, similarly to the proportion of iron to copper, can reflect the course of iron metabolism in the body. Abnormal proportion of calcium to iron, at low quantity of iron, can suggest susceptibility to anaemia.

4.1 Intoxication

Lead Intoxication

Lead intoxication, also known as lead poisoning, is a medical condition caused by the accumulation of lead in the body. Lead is a toxic heavy metal that can damage almost every system of the human body, including the nervous, blood-forming, urinary, reproductive... It is particularly dangerous for children, in whom it can cause irreversible developmental disorders.

Chronic exposure to elevated levels of lead can result in problems with concentration, memory and nerve conduction.

Lead weakens the body's immune response, leading to increased susceptibility to infection. It reduces the number of certain types of immune cells, such as T lymphocytes. Lead affects the production and secretion of cytokines, which are key proteins in intercellular communication in the immune system. An imbalance of these can lead to abnormal inflammatory reactions. Lead can affect the function of macrophages, the cells responsible for phagocytosis (engulfment of pathogens) and regulation of the inflammatory response. Chronic lead exposure can lead to long-term health problems, including autoimmune diseases.

Lead affects the endocrine system, mainly endocrine axes such as the hypothalamic-pituitary-adrenal axis, leading to a disruption in the production of stress hormones (cortisol). Lead intoxication can disrupt the balance of sex hormones (oestrogen and testosterone). Lead leads to changes in the menstrual cycle in women and to fertility problems. Lead inhibits thyroid hormones, leading to hypothyroidism. Lead affects glucose metabolism and insulin secretion, which increases the risk of type 2 diabetes and other metabolic disorders. Chronic lead intoxication leads to serious chronic endocrine disruption, which can cause cardiovascular disease, obesity and psychiatric disorders.

The human body has immune mechanisms to defend itself against pathogens, including toxic metals. These mechanisms include the antagonistic action of bio-elements against all toxic metals. The lack of bio-elements promotes the process of toxic metal intoxication. Exposure to toxic metals disrupts the metabolism of bio-elements. Both lead to the emergence of very negative health trends. Diagnostics of the impact of the environment on the human body, specifically the Elemental Hair Analysis, allows the detection of bio-element deficiencies and the detection of toxic metal intoxication.

Avoiding exposure to lead and controlling its levels in the body (via Elemental Hair Analysis) is key to maintaining health and wellbeing.

1. Sources of lead exposure

Lead can enter the body through the respiratory tract, gastrointestinal tract or skin. The main sources of exposure are:

Lead paint: used in houses built before 1978. Flaking paint and lead dust are particularly dangerous for children.

Drinking water: lead or lead-soldered pipes can release lead into the water.

Soil and dust: contaminated soil near motorways or old buildings may contain lead.

Toys and cosmetics: some imported toys and traditional cosmetics (e.g. kohl) may contain lead.

Occupational exposure: workers in the battery industry, mining or those renovating old houses are particularly exposed to lead compounds.

2. Symptoms of lead poisoning

Symptoms depend on the level and duration of exposure to lead. A distinction is made between acute and chronic poisoning:

In children:

- Developmental delay, learning difficulties, irritability.
- Loss of appetite, abdominal pain, vomiting, anaemia.
- In severe cases: convulsions, coma, kidney damage.

In adults:

- Headaches, weakness, memory impairment, hypertension.
- Joint and muscle pain, mood disorders, infertility.
- In case of long-term exposure: peripheral neuropathy, kidney damage.

3. Diagnostics

Blood test: measures blood lead levels; for children the acceptable level is <10 μg/dL, for adults <25 μg/dL.

The Elemental Hair Analysis shows lead intoxication: higher doses of lead e.g. from food (fish, vegetables, work environment, etc.) or small doses over a longer period of time (dust, foodstuffs, water).

Additional investigations: X-ray of the bones (lead is deposited in the bones), urinalysis, assessment of renal function.

4. Detoxification

Eliminating the source of lead: the first step in treatment is to remove the source of exposure, e.g. removing lead paint or replacing water pipes.

Chelation therapy: used in severe cases; compounds such as alpha lipoic acid, EDTA, D-penicillamine bind lead and facilitate its excretion in the faeces or urine.

Supportive therapies: calcium, iron and vitamin C supplementation to reduce lead absorption.

5. Prevention.

Home safety: Regular dust cleaning, avoiding renovation of old houses without proper protective measures.

Safe water: Using water filters and avoiding hot tap water for drinking.

Hygiene: washing hands and toys, especially for children.

Screening: regular testing of lead levels in children and occupationally exposed persons.

6. Long-term effects of lead intoxication

In children: permanent brain damage, reduced IQ, behavioural problems.

In adults: chronic kidney disease, hypertension, fertility disorders.

Summary

Lead poisoning is a serious health risk, especially for children. Prevention, early diagnosis and effective treatment are key. Avoiding sources of exposure and regular testing can significantly reduce the risk of poisoning. If lead poisoning is suspected, immediate medical intervention is essential.

Causes of disorders in toxic lead ratios.

Lead intoxication is most often caused by exposure to environmental factors such as dust (e.g. from gravel roads and busy streets) and fumes (in localities where houses are heated with coal cookers), drinking water from lead pipes, lead paint used for interior painting (usually white paint), consumption of Baltic fish (lead is most often detected in herring), consumption of tuber vegetables growing along motorways and other traffic routes, occupational contact with lead (heavy industry, metallurgy, metalwork, welding, soldering). Increased uptake of toxic metals including lead is promoted by an inadequate diet low in calcium, a diet containing highly processed foods, extreme elimination diets and poor nutritional status.

Ratio from Elemental Hair Analysis - Ca/Pb

Importance of the calcium to lead ratio

The human body requires a balance in calcium mineral metabolism. Proper transmineralisation of calcium is necessary for the proper functioning of the skeletal, nervous, immune and endocrine systems. Lead acts antagonistically to calcium. Excess lead interferes with calcium absorption, leading to decreased bone density and osteoporosis, muscle weakness, chronic fatigue, emotional disturbances, weakened immune system, hormonal problems. Lead is deposited in the bones, so the process of removing it from the body takes many months. People who have been lead-intoxicated have their cellular nutrition and detoxification mechanism impaired, leading to a weakened ability to function properly and regenerate cells. Lead is therefore a carcinogen. Most people who have too much lead relative to calcium in their Elemental Hair Analysis are very poorly nourished and are very easily further intoxicated. Detoxification can only be effective if you follow the recommendations from the Elemental Hair Analysis and eliminate sources of lead from your environment.

Restoration of normal calcium levels.

A calcium-rich diet and dietary supplements with calcium, vitamins D3 and K2, can help to balance calcium metabolism. A varied diet consisting of natural, non-processed foods, mainly dairy and in addition: groats, fish, leafy vegetables, pulses and tubers, cereal products, seeds, grains and nuts (if there are no contraindications to the consumption of the foods mentioned).

Detoxification of the organism should begin with the removal of the sources of lead exposure, followed by the use of an appropriate detoxification method and a properly selected diet (recommended in the description of the Elemental Hair Analysis).

Ratio from Elemental Hair Analysis - Cu/Pb

Importance of the copper-lead ratio

Lead intoxication has a significant impact on copper metabolism, which can lead to various health disorders.

Lead interferes with the absorption of copper in the intestines, leading to a reduction in its bioavailability. Lead decreases the synthesis of ceruloplasmin, a copper-transporting protein, leading to impaired copper metabolism. Ceruloplasmin is a key protein in copper metabolism and low levels can lead to copper toxicity. Free non-ceruloplasmin-bound copper ends up in the hair and not in the cells.

Free copper disrupts the hormonal balance in women (estrogen/progesterone).

Poor copper mineralisation reduces the excretion of copper from the body. Excess free copper in the circulatory mechanisms causes accumulation and leads to liver and brain damage (neurological dementias).

Lead can affect the activity of enzymes that require copper as a cofactor. These enzymes are mainly associated with iron metabolism and the antioxidant barrier. Excess free copper in the body leads to anaemia (due to poor iron mineralisation) and a weakened antioxidant barrier (rapid free radical ageing).

Cellular copper deficiency due to lead intoxication can lead to anaemia (due to lack of ceruloplasmin), weakened immune system and nervous system problems.

Ratio from Elemental Hair Analysis - Fe/Pb

Importance of the iron-lead ratio

Iron is a key element required for haemoglobin production and oxygen transport in the blood. Insufficient iron can lead to anaemia, weakness and fatigue. Lead, on the other hand, being a toxic metal, competes with iron and interferes with its absorption and utilisation, which can exacerbate iron deficiency problems.

An abnormal iron/lead ratio is indicative of impaired metabolic processes, including impaired mental performance (cognitive and learning abilities) and vegetative processes (continuous fatigue syndrome), reduced detoxification efficiency, impaired immune function, degradation of the antioxidant barrier (acceleration of free radical wasting processes in the body).

Causes of ratio imbalances

Increased exposure to lead can come from environmental pollutants such as dust from gravel roads or dust from coal combustion, car exhaust, lead paint (for interior painting), green vegetables from fields close to roads, tuber vegetables from farms close to thermal power plants, plantations where glyphosate is used (glyphosate alters the mineralisation of soils), contaminated water (old buildings had lead water pipes installed).

Iron deficiencies often occur as a result of inadequate diet, too low a supply of iron-rich products, long-term use of drugs or supplements that interfere with iron absorption or metabolism, chronic diseases leading to excessive iron loss, inborn metabolic traits, toxic metal intoxication (even in low doses), and others.

Restoration of normal iron levels

1. Increased iron intake:

Including iron-rich foods in the diet, such as red meat (heme iron is best absorbed), green leafy vegetables, legumes and fortified cereal products, iron supplements can help improve iron levels. Natural iron supplements in smaller doses (up to 18 mg) work best. Consumption of iron supplements with higher doses of iron, can lead to adverse changes in the intestinal environment. Patients taking iron supplements may experience black stools, mucus in the stool, constipation or diarrhoea.

2. Avoiding exposure to lead:

Consciously avoiding sources of lead and implementing preventive measures can reduce exposure to this toxic metal.

Examples: using water filters, air purification devices in the home, buying groceries from reliable sources, changing

clothes and always washing hands when coming home.

3. Supplementation and detoxification:

Application of the nutritional programme prescribed in the Elemental Hair Analysis, that is: a diet supplemented with antioxidants, vitamins and minerals as indicated in the Elemental Hair Analysis.

Ratio from Elemental Hair Analysis - Mg/Pb

Importance of the magnesium-lead ratio

1. Mineral balance: Magnesium plays a key role in various biological functions, including neuromuscular regulation, protein synthesis and energy (ATP) production. Low magnesium levels in relation to lead can lead to a weakening of these processes, negatively affecting the health of the nervous and muscular systems.

2. Detoxification: Magnesium supports the body's natural detoxification processes, including the elimination of heavy metals. Excess lead in relation to magnesium can interfere with these processes, leading to the accumulation of various toxins in the body.

3. Mental and emotional health: Magnesium is important for nervous system function and emotional balance. Its deficiency, combined with lead exposure, can increase the risk of anxiety, depression and other mental health problems.

Causes of ratio imbalances

An abnormal ratio of magnesium to lead is often due to environmental and nutritional factors. Exposure to lead can come from polluted air and drinking water (old buildings had lead water pipes installed), from dust from gravel roads or dust from coal combustion, from car exhaust, from lead paint (for interior painting), green vegetables from fields close to roads, tuber vegetables from farms close to CHP plants, from plantations where glyphosate is used (glyphosate alters soil mineralisation), etc.

Magnesium deficiencies are usually the result of a diet low in the mineral, excessive consumption of processed foods and increased stress, which depletes magnesium stores.

Restoration of normal magnesium levels

1. Increase the intake of magnesium:

Incorporating magnesium-rich foods such as nuts, seeds, green leafy vegetables and whole grains into the daily diet will help to correct deficiencies.

2. Reducing exposure to lead:

Consciously avoiding sources of lead and implementing preventive measures can reduce exposure to this toxic metal.

Examples: using water filters, air purification devices in the home, buying groceries from reliable sources, changing clothes and always washing hands when coming home.

3. Supplementation and detoxification:

Please follow the individual recommendations from the Elemental Hair Analysis. In addition, therapies used in rehabilitation can be used, i.e.: balneology (salt baths), argillotherapy (body wraps with clays, gel colloids).

Cadmium intoxication

1. Sources of exposure to cadmium

Cadmium is a heavy metal found in the environment, but the main sources of exposure for humans are related to industrial activities and lifestyles:

Smoking - tobacco accumulates cadmium from the soil and smokers absorb it through smoke. Smoking doubles the average daily dose of cadmium.

Food - contaminated cereal products (rice), leafy vegetables (spinach, lettuce), root vegetables (carrots, potatoes), seafood (oysters, clams) and offal (liver, kidney).

Work environment - metallurgy, mining, battery, paint and plastic production. Inhalation of cadmium dust or fumes is particularly dangerous.

Other sources - cheap jewellery, toys, contaminated water and soil near landfill sites.

2. Symptoms of poisoning.

Acute poisoning (rare, usually associated with inhalation of high doses):

- Fever, chills, weakness.
- Headaches, nausea, vomiting, diarrhoea.
- Pneumonia, pulmonary oedema, respiratory failure (may lead to death within 24 hours).

Chronic poisoning, effects of long-term exposure:

- Kidney: proteinuria, renal tubular damage, kidney stones.
- Bones: osteoporosis, osteomalacia (bone softening), joint pain.
- Respiratory system: chronic obstructive pulmonary disease, emphysema.
- Others: metallic taste in the mouth, yellow stubble at the base of the teeth, anaemia, fertility disorders, increased risk of cancer (e.g. lung, prostate).

3. Diagnostics

Laboratory tests: Measurement of cadmium concentration in blood (reflects recent exposure) or urine (better for assessing long-term accumulation).

Additional tests: Elemental Hair Analysis, nails (long-term exposure), imaging tests (lung X-ray, bone density assessment).

Determination of biomarkers: The presence of protein, glucose or amino acids in the urine indicates kidney damage.

4. Detoxification

Immediately cutting off the source of exposure - a key step.

Chelation therapy: use of metal-binding agents (alpha lipoic acid), effectiveness may be limited due to strong binding of cadmium to proteins.

5. Symptomatic treatment:

- Gastric lavage in case of oral poisoning.
- Oxygen therapy in respiratory failure.

- Supplementation with calcium, vitamin D, zinc and selenium - reduce the absorption of cadmium.
- Monitoring of renal and hepatic function - dialysis in severe cases.

6. Prevention

Avoiding smoking - a major source of cadmium in non-industry.

Diet:

- Choosing natural functional foods, avoiding high-risk products (e.g. rice from contaminated regions).
- Cooking root vegetables reduces cadmium content.
- Enrich the diet with calcium, iron, zinc - they compete with cadmium for absorption.

Protection at work: Use of masks, ventilation, regular examination of workers.

7. Threat

Cadmium has a long half-life in the body (10-35 years), which makes detoxification difficult. Chronic poisoning leads to irreversible kidney and bone damage. Early diagnosis and elimination of exposure can slow the progression of the disease, but complete removal of the metal is impossible.

Summary

Cadmium poisoning poses a serious risk, especially for occupationally exposed people and smokers. Diagnosis (Elemental Hair Analysis), prevention, periodic medical examinations and awareness of sources of exposure are key. If symptoms occur, immediate medical intervention is essential.

Ratio from Elemental Hair Analysis - Zn/Cd

Zinc is an essential trace element that plays a key role in immune system function, enzyme production and protein and DNA metabolism.

Cadmium is a toxic heavy metal that can interfere with zinc absorption, leading to various health disorders such as a weakened immune system and skin problems.

Zinc and cadmium are antagonistic elements.

1. Nervous system health: Zinc is important for proper brain function, and a low zinc/cadmium ratio can affect neurotoxicity, potentially leading to cognitive and emotional problems.

2. Endocrine system: Zinc deficiencies or excess cadmium can affect the production of hormones, e.g.: sex hormones, which can lead to reproductive disorders, thyroid hormones, which leads to serious metabolic disorders, etc.

Causes of ratio imbalances

Deficiencies in the ratio of zinc to cadmium can result from a variety of environmental and dietary factors. Exposure to cadmium often occurs through a polluted environment, smoking and a diet containing products contaminated with this metal. Zinc deficiencies can be caused by an inadequate diet, too low protein intake and chronic illnesses and the use of long term medication or certain supplements e.g.: iron or copper.

Restoring normal levels

1. Zinc-rich diet:
Including zinc-rich foods in the diet, such as meat, nuts, seeds and whole grain products, can help to increase levels

of this element. At the same time, it is important to avoid or limit sources of cadmium, such as foods contaminated with this metal (fish, tuberous vegetables).

2. Detoxification: Detoxifying the body by increasing the intake of insoluble fibre, supplements (mainly alpha lipoic acid) and herbs that aid in cleansing the body (supporting liver function), can help remove excess cadmium.

3. Supplementation and detoxification:

Please follow the individual recommendations from the Elemental Hair Analysis. In addition, therapies used in rehabilitation can be used, i.e.: balneology (salt baths), argillotherapy (body wraps with clays, gel colloids).

Arsenic intoxication

Arsenic poisoning is a serious health condition that can lead to acute and chronic symptoms and even death if not detected early and treated properly. Arsenic is a naturally occurring element in the environment, but its toxic forms, especially inorganic, pose a threat to human health.

Causes of arsenic poisoning

1. Food: rice, seafood, fish and some vegetables (e.g. Brussels sprouts) can accumulate arsenic from the soil or water.
2. Occupational exposure: workers in metallurgy, mining, glass production or agriculture are exposed to inhalation or contact with arsenic.
3. Environmental sources: coal burning, smoking, use of arsenic-containing pesticides.
4. Contaminated drinking water: the most common cause of poisoning, especially in regions where groundwater contains high concentrations of arsenic, e.g. Bangladesh, India and some areas of the USA.

Symptoms of arsenic poisoning

Acute poisoning (after short-term exposure to high doses):

- Gastrointestinal disorders: nausea, vomiting, abdominal pain, bloody diarrhoea.
- Neurological symptoms: headaches, disorientation, convulsions, coma.
- Cardiovascular problems: hypotension, cardiac arrhythmias, shock.
- Death can occur as a result of multiple organ failure.

Chronic poisoning (after long-term exposure to low doses):

- Skin lesions: hyperpigmentation, epidermal keratosis, pre-neoplastic lesions.
- Cancer: skin cancer, lung cancer, bladder cancer, kidney cancer.
- Neurological problems: peripheral neuropathy, limb numbness, cognitive impairment.
- Cardiovascular diseases: hypertension, heart disease, strokes.

Diagnostics

Laboratory tests: urine analysis, blood analysis, Elemental Hair Analysis or nail analysis can detect arsenic levels in the body.

Urine tests are most effective for acute poisoning, while Elemental Hair Analysis and nail analysis are used to assess long-term exposure.

Detoxification

1. Immediate action: removal of source of exposure, gastric lavage, administration of activated charcoal.

2. Chelation therapy: use of agents to remove arsenic from the body, such as dimercaprol succinate (DMSA), dimercaprol (BAL), alpha lipoic acid.

3. Supportive treatment: hydration, control of renal and cardiac function, symptomatic treatment.

Prevention

1. Limit the consumption of rice and seafood: rinsing and cooking rice in plenty of water can reduce arsenic content.
2. Occupational protection measures: use of protective clothing and masks in occupations exposed to arsenic.
3. Safe drinking water: use of reverse osmosis filters or bottled water in regions with high arsenic levels.

Long-term effects of arsenic intoxication

Chronic exposure to arsenic can lead to serious diseases, including cancer, type 2 diabetes, heart disease and developmental disorders in children.

Summary

Arsenic poisoning is a global health problem, especially in regions with high levels of environmental pollution (industrialised regions, landfills, arsenic-containing soils: Bangladesh, India, some areas of Central and South America). Special attention should be paid to vegetables imported from these regions. Early diagnosis and appropriate treatment are key to avoiding serious complications.

Mercury Intoxication

Mercury poisoning is a serious health condition resulting from exposure to mercury in various forms.

Causes of mercury poisoning

1. Food - a major source of exposure, especially predatory fish (tuna, swordfish, shark) and seafood, which accumulate methylmercury in the food chain.
2. Amalgam fillings - contain approx. 50% mercury, but release minimal amounts considered safe by the WHO.
3. Mercury thermometers - breaking the thermometer releases toxic fumes.
4. Industrial exposure - mining, chemical production, coal combustion.
5. Cosmetics and historical medicines - e.g. paints with cinnabar (mercury sulphide) or folk remedies.

Forms of mercury and their toxicity

1. Metallic (elemental) mercury: It is not absorbed through the skin or gastrointestinal tract, but its vapours damage the respiratory and nervous systems.
2. Inorganic compounds (e.g. mercuric chloride): Corrosive to mucous membranes, damages kidneys and intestines. The lethal dose of mercuric chloride is 1-4 g.
3. Organic compounds (e.g. methylmercury): The most toxic, they accumulate in the brain and tissues, leading to neurological damage.

Symptoms of poisoning

Acute intoxication (after exposure to high doses):

1. Inhalation of vapours: coughing, shortness of breath, pneumonia, respiratory failure.
2. Ingestion of inorganic compounds: bloody vomiting, diarrhoea, intestinal necrosis, acute renal failure.

Chronic intoxication (long-term exposure):

1. Neurological: muscle tremors, memory disorders, depression, 'mad hatter's syndrome' (historically in artisans).
2. Others: kidney damage, endocrine disruption, immune weakness, miscarriages.

Diagnostics

1. Laboratory tests: determination of mercury concentration in blood (preferably within a few hours of poisoning) or in urine and hair (to assess long-term exposure).
2. Additional tests: blood count, creatinine level, liver enzymes.
3. Elemental Hair Analysis: allows assessment of exposure over the past months.

Detoxification

1. First aid:

- In case of vapour inhalation - evacuation from the contamination zone, gastric lavage, administration of activated carbon.
- In case of skin contact, wash with soap and water.

2. Chelation therapy:
Drugs: DMPS (Unithiol), DMSA or dimercaprol (BAL), alpha lipoic acid, which bind mercury and facilitate its excretion in the urine.

3. Supportive treatment: dialysis for kidney damage, hydration, blood pressure control.

Prevention

1. Diet: limit consumption of mercury-poisoned fish (e.g. tuna, shark); especially in pregnant women and children.

2. Safety at home: avoiding mercury thermometers, proper disposal of fluorescent lamps (handing them in at hazardous waste collection points).

3. Occupational protection: use of masks and protective clothing in industry.

4. Replacement of amalgam fillings: recommended in case of allergies or pregnancy planning.

Long-term effects

Chronic poisoning can lead to:

- permanent brain damage (e.g. reduced IQ, impaired coordination).
- heart disease (increased risk of heart attack).
- renal and hepatic insufficiency.
- fertility disorders in both genders.

From history

Mercury was used in the Middle Ages to treat syphilis. Alchemists considered mercury to be the 'mother of metals'.

Summary

If mercury poisoning is suspected, consult a doctor immediately or contact a toxicology centre. Prevention and awareness of sources of exposure are key to avoiding complications.

5. Metabolic type (biological nature) characteristics

Reference names: dominant features are underlined.

Energetics

slow **quick**

Sympathetic/parasympathetic

sympathetic **parasympathetic**

Digestion

slow **quick**

Free-radical Ageing

slow **quick**

Metabolic Equilibrium

catabolism anabolism

Reaction To Stress

good **bad**

Endocrine Function

Adrenal Cortex - Efficiency

good poor

Thyroid - Efficiency

good **poor**

Acid-base Equilibrium

Acidification With Uric Acid

yes no

Acidification With Lactic Acid

yes **no**

Quick type D / Parasympathetic / metabolism characteristic of the adrenalin type

5.1. Systemic energetics

Phosphorus is indispensable in all cellular processes of energy generation. The calcium to phosphorus proportion indicates accumulation of phosphorus or calcium in the cells and demonstrates which type of energy turnover predominates in the organism. Phosphorus is the basic component of high-energy compounds (energy carriers). Calcium is involved in intra- and extracellular communication (transport of nutrients through biological membranes). It takes part in the transmission of stimuli to the nervous system. The calcium to phosphorus ratio determines the rate of systemic energy turnover processes.

Fast metabolism

The result indicates predominance of quick energy turnover processes, so-called quick metabolism.

5.2. Assessment of equilibrium in the autonomic nervous system; sympathetic-parasympathetic equilibrium

Within the nervous system, the central nervous system (CNS), peripheral nervous system (PNS) and vegetative, or autonomic nervous system (ANS) can be distinguished. The CNS includes the brain and the spinal cord. The PNS is composed of the cranial nerves and their ganglia, spinal nerves and their ganglia, as well as receptors receiving stimuli. The ANS consists of two systems: the function of one (so-called sympathetic) is opposed by the other (so-called parasympathetic). ANS is a part of the nervous system responsible for involuntary actions. It regulates the functions of the internal organs. Depending on the situation, either the sympathetic or the parasympathetic system dominates in each subject. This equilibrium is determined by the mode of energy utilizatiion in the organism, e.g.: when we are eating a meal, we become parasympathetics (we accumulate energy); when we are running, we are sympathetics (we utilize energy).

Domination of the parasympathetic nervous system

Stimulation of the parasympathetic system activates anabolic processes. It results in slower heart rate, dilation of blood vessels in the brain, lowering blood pressure, contraction of intestinal and bronchi muscles, sphincter weakness, increased production of gastric acid, intestinal juice, urine and sweat, pupil constriction. Increased intestinal peristaltics facilitates digestion and absorbtion of food.
Such people are very systematic and meticulous. They do not make quick decisions, they need to be prompted to action, they suffer from the lack of sleep and have a tendency for a bad mood. In order for the parasympathetic dominant to remain balanced, the sympathetic part needs to be activated, as this results in a better mood and more energy. In the case of a wrong diet, sympathetic domination will quickly lead to significant mood worsening and total lack of energy. In order to retain a good mood, such a person needs to be balanced by the sympathetic part of the autonomous nervous system by increased intake of calcium and phosphorus. Light physical effort (which improves breathing), regular rest and good sleep are recommended, as they oxygenate the organism.

5.3. Digestion

Fast digestion

The mineral turnover profile indicates quick absorption and utilization of nutrients. This may lead to acceleration of the metabolic rate. The organism may have problems with long-term maintenance of appropriate energetic equilibrium. The subjects representing this metabolic type tend to eat and snack frequently.

5.4. Endocrine functions

The mineral turnover profile indicates increased activity of the adrenal glands and decreased activity of the thyroid (not to be confused with hyperactivity of the aforementioned endocrine glands). The internal systemic stability (homeostasis) is directly dependent on the following systems: cardiovascular, respiratory, digestive, thermoregulation and endocrine glands.
A patient with long-term predominance of quick generation of energy may demonstrate (but not necessarily – the lifestyle, medications, supplements, diet, may eliminate the following symptoms):

- elevated body temperature,
- irritability,
- high blood pressure,
- excessive sweat secretion,
- body weight gain in waist and shoulder region.

5.5. How quickly is your organism ageing?

The human organism is ageing from the moment of birth. A few ways of ageing have been described. Free radical reactions have the most significant influence on the course of ageing processes. The largest group among free radicals are reactive oxygen species (ROS).
If free radicals are generated on a limited scale, they play a positive role for the organism. If this scale is large and the process lasts for a long time, it may cause significant damage, leading to civilization diseases.
Free radical theory of ageing is based on the efficiency of respiratory chain reactions. This efficiency is becoming lower and lower with age, particularly with respect to people above 50 years of age.
At each site where free radicals can be generated, the organism has developed defense mechanisms, which are so distributed to act in a way complementary to one another. Enzymatic defense, the efficacy of which is provided by zinc, copper and manganese, is the most important. If the enzymatic barrier is too weak, the defensive role is taken over by selenium, antioxidative vitamins: E, A and C, bioflavonoids, biothiols and other antioxidants of plant origin. There are close correlations between the ageing processes, nutritional patterns and efficiency of the antioxidative barrier. On that basis, the scale of damages caused by free radicals and the ageing rate of the organism can be determined.

Regular free-radical ageing

Impairment of the antioxidative barrier is possible. Change of the diet and antioxidative supplements should improve its efficiency. Moderate aging rate.

5.6. Psycho-emotional equilibrium assessment - reaction to stress

In medicine stress is a condition manifesting itself with a number of nonspecific changes induced in the whole biological system, human or animal, by a stressor. Mental stressors include e.g.: situational stimuli, conflicts and frustrations. Any factor (e.g. biological, chemical, thermal, exertion or lack of physical activity, tiredness, changes of weather, toxic factors, emotions, physical contact with the environment, diseases), triggering more or less pronounced nonspecific changes can be a stressor. Stressors lead to disturbances of the systemic homeostasis. If the stressor is very strong (or long-lasting), it leads to exhaustion of the adaptation potential. It is associated with increased risk of many pathologies, e.g. cardiovascular diseases, rheumatic disease, dyspepsia, metabolic disorders, or allergic reactions. The main regulators of stress syndrome are: the brain, nerves, the pituitary, the thyroid, adrenals, liver, kidneys, blood vessels, connective tissue, white blood cells. The complex of systemic changes triggered by stressors is referred to as systemic adaptation syndrome. It develops through three stages (phases):

- The alarm phase - stimulation of the adrenal cortex to secrete glucocorticoids.
- The adaptation phase - systemic changes allowing to ensure coping with (survival of) stress.
- The exhaustion phase - if exposure to stressors is too long, a pathology develops.

Stress does not have to be harmful(stress/distress). The human life is associated with functioning under continuos stress. It is inevitable and even necessary for life. Some kinds of stress can be motivating and positive. Distress is destructive for the organism. If it is prolonged, it may lead to health deterioration.

The aim of the recommended diet is to prepare the organism for an adequate response to stress, according to the stressor involved and the hazard level. Appropriate response makes it possible to reduce the level of stress (de-stressing - relaxation).

In Your organism, the quick mineral turnover profile indicates a tendency towards high metabolic rate. Such condition may lead to manifestation of all stress phases, i.e.: alarm phase, adaptation phase, exhaustion phase. A patient with quick energy generation predominance has a high demand for antioxidants.

The result indicates systemic abnormalities due to stressors.
Your organism coopes with stress poorly.

5.7. Metabolic equilibrium assessment - catabolism/anabolism

Metabolism comprises the overall spectrum of chemical reactions and energetic processes taking place in the cells. Metabolic processes make it possible for the cells to grow and proliferate, manage their internal structure and respond to external stimuli. The metabolic pathways can be divided into two types: anabolism, i.e. „building" and catabolism, i.e. „burning". In adolescence, anabolism should be predominant, and in adult subjects it should be balanced with catabolic processes. In the case of domination of anabolism in an adult, the processes of fat accumulation in adipose tissue can be enhanced, which leads to overweight. Significant predominance of catabolic processes evidences the potential for generation of excess energy, which may be associated with increased production of free radicals and high risk of civilization diseases.

Mineral turnover, illustrated by proportions between bioelements, indicates the effect of hormonal activity (without indicating the amount of hormones) in the specific organs, i.e. is a reflection of neuroendocrine functions. Slight changes in hormonal activity over a short period of time do not affect the equilibrium of mineral turnover.

Long-term changes in hormonal functions significantly disturb homeostasis, which results in permanent changes of mineral turnover. Elemental analysis of hair makes it possible to detect this phenomenon.

Increased activity of catabolic processes

The result indicates increased activity of catabolic processes.

Selection of appropriate diet for a particular person is dependent on metabolic equilibrium of the organism. If the processes of decomposition of organic compounds (catabolism) outweigh the processes of their synthesis (anabolism) mainly fatty acids are processed in the liver. In many cases, such condition may lead to acceleration of metabolic processes.

5.8. Assessment of acid-base equilibrium efficiency

Acidification of the organism is most frequently caused by excessive production of lactic acid. It is produced as a result of various factors, including, among others, deficiency of minerals and vitamins indispensable to generate energy in the cells, or during emotional and psychological disorders. Such condition may develop if too much energy is generated by glycolysis with hypoxia and weak musculo-hepatic cycle. The respiration at the cellular level is impaired, leading to an energetic deficit.

Acidification of the organism will be reflected in particular in impairment of the immune function. Additionally, mineral and/or vitamin deficiency may cause a dysfunction of cellular respiration in various tissues, which may be manifested by continuous tiredness. Elevated concentration of lactic acid causes intracellular acidification. To counteract the excess acidity, calcium, as a neutralizing factor, begins to deposit in the tissues. The blood is well-buffered to maintain the Ca level of 9-11 mg%. When Ca concentration falls below 9 mg%, the parathyroids activate the production of PTH, which causes transfer of Ca from the bones and teeth to soft tissues and mitochondria.

Such energy deficit may lead to distant consequences in the activity of anabolic and catabolic processes. If the condition is prolonged, it causes hyperparathyroidism, involving transport of increasing amounts of calcium and magnesium to the cells. Excessive activity of the parathyroids will be visible in the elemental analysis as increased content of calcium and magnesium in the hair.

The second type of acidosis is due to consumption of proteins of animal origin with high content of purines, which are catabolized to uric acid. With decelerated detoxification by the urea cycle, the organism is acidified by excess uric acid. To neutralize acidification, Ca and Mg transport to the tissues is increased. The effect visible in elemental analysis will be increased levels of Ca, Mg and P. The consequence of such condition will be increased bone calcium loss, which leads to osteoporosis, dental caries and calcification of soft tissues. Increased mitochondrial Ca and Mg levels will impair intracellular respiration and energy production rate. Correction of vitamin and mineral deficiency is necessary, as well as improvement of systemic detoxification mechanisms and change of the diet.

The result indicates acidification of the organism due to excessive amount of uric acid.

The diet consumed so far has been not differentiated enough, containing proteins with too high purine content and inappropriate fats.

5.9. Health-related tendencies

- **This profile suggests increased risk of the development of osteoporosis 2 [high Ca/Mg**

proportion, low concentration of copper].

- **This profile suggests possibility of cellular immunity disorders.**
- **This profile suggests susceptibility to development of iron deficit anaemia.**
- **This profile suggests susceptibility to neuro- muscular disorders.**
- **This profile suggests susceptibility to pancreas and spleen disorders, which may be connected with changing concentration of glucose in the blood and decreased production of pancreatic enzymes, and may lead to disturbances of proteins and fats absorption.**
- **This profile suggests increased risk of arteriosclerosis.**
- **This profile suggests susceptibility to collagen synthesis disorders, which can lead to increased risk of development of osteo-articular system disorders.**
- **This profile suggests possibility of neurovegetative system disturbances.**
- **This profile suggests susceptibility to development of alimentary and respiratory allergy, which may be due to low Ca/Pb proportion and high concentration of lead.**

6. Supplementation scheme

Below, we recommend daily doses. The recommended substances may contain microelements and vitamins which are not identical to those indicated as needed in the chart. This is because microelements and vitamins interact and this leads to an optimum mineral composition of the organism.
We recommend supplements from natural sources. Purified water (e.g. filtered in a special kit) should be used for drinking and reparation of meals.

Part One - Nutrition scheme

Supplement	morning	afternoon	evening
Lactobacillus acidophilus - Lactobacillus plantarum every two days, for one month	1 before meal	0	0
INUBIOTYK® MAŚLAN https://biomol.online/ every day, for one month	2 after meal	2 after meal	0
Vit. C 240 mg from acerola and citrus every day, for one month	2 before meal	2 before meal	0
B-complex (100% DRV) every day, for one month	3 after meal	3 after meal	0
Calcium 200 mg + Magnesium 100 mg every day, for one month	0	0	1 after meal
Magnesium 200 mg every day, for one month	1 after meal	1 after meal	0
Selenium 50 mcg every day, for one month	1 after meal	0	0
Zinc 15 mg every day, for one month	0	0	1 after meal
Chromium 100 mcg every day, for one month	0	1 after meal	0
Omega-3 (EPA 180 mg, DHA 120 mg) every day, for one month	0	1 30 minutes before meal	1 30 minutes before meal
OLIOBIOTYK FOR MEN every day, for one month	0	1 With lunch	0
BETA CAROTENE 7MG every day, for one month	0	0	1 after meal
Lipoic acid 300 mg every day, for one month	1 after meal	0	0
Garlic 400 mg every day, for one month	2 after meal	0	2 after meal
CURCUMIN 400mg every day, for one month	2 after meal	2 after meal	0
Glucosamine 250 mg + Boswellia every day, for one month	1 after meal	0	1 after meal

Lecithine 1200 every day, for one month	0	0	1 after meal
L-ORNITHINE 500MG every day, for one month	0	1 after meal	0
Silymarol (extract from milk thistle) 70 mg every day, for one month	0	0	1 after meal
Vitamin D3 2000 IU + K2 50 mcg every day, for one month	0	1 30 minutes before meal	0

Part Two - Preventive scheme

Supplement	morning	afternoon	evening
Lactobacillus Bifidobacterium Man Balance every three days, for six months	1 after meal	0	0
INUBIOTYK LONG4LIFE every day, for six months	1 after meal	1 after meal	0
Vit. C 240 mg from acerola and citrus every day, for six months	2 before meal	2 before meal	0
B-complex (100% DRV) every day, for six months	2 after meal	0	0
Calcium 200 mg + Magnesium 100 mg every day, for six months	0	1 after meal	1 after meal
Magnesium 200 mg every day, for six months	1 after meal	0	0
Vitamins + minerals + antioxidants every day, for six months	0	1 after meal	0
Omega-3 (EPA 180 mg, DHA 120 mg) every day, for six months	0	1 30 minutes before meal	1 30 minutes before meal
OLIOBIOTYK FOR MEN every day, for six months	0	1 With lunch	0
QUERCETIN 500 mg every two days, for six months	1 after meal	0	0
LYCOPENE 10mg every two days, for six months	0	0	1 after meal
Garlic 400 mg every day, for three months	2 after meal	0	2 after meal
CURCUMIN 400mg every day, for three months	2 after meal	2 after meal	0
Glucosamine 250 mg + Boswellia every day, for three months	1 after meal	0	1 after meal
Lecithine 1200 every two days, for six months	0	0	1 after meal
L-ORNITHINE 500MG every two days, for six months	0	1 after meal	0
Silymarol (extract from milk thistle) 70 mg every day, for six months	0	0	1 after meal
Vitamin D3 2000 IU + K2 50 mcg every day, for six months	0	1 30 minutes before meal	0

Note

The foregoing scheme is just a proposal for doctors, who will take the final decision of the supplementation. Food supplements should only be taken with meals in order to increase their absorption. Supplementation is intended to balance the quantity of elements in organism utilising the interactions between them.

The result has been issued in accordance with the PB-01 test procedure. from 01.02.2016
Test result authorised by:
The result was verified by: on: Feb.

7. Mineral change

Ca - Calcium

Calcium is an important mineral component of the human body, responsible for many regulatory mechanisms. It is necessary for many processes: neuro-muscular conductivity, activity of muscles, normal development of the skeletal system, blood clotting, activation of enzymes, permeability of membranes. It is present in the human body in amounts exceeding any other element. About 99% of calcium is deposited in the bones. Ionised calcium plays an important role in blood clotting, maintaining normal excitability of heart muscle, skeletal muscles and nerves. Calcium regulates the activity of many enzymes, function of muscles, wound healing, hormonal transmission of stimuli, strong bones, relaxed nerves, optimism, enthusiasm, cheerful and calm mood, normal activity of the heart, normal blood clotting, iron absorption, healthy teeth, normal sleep. Calcium enables conductivity of stimuli and contractility of muscle fibres, partakes in many enzymatic processes, regulates heart rate, exerts antiallergic effect and makes biological membranes less permeable.

Occurrence: chocolate, figs, peas, beans, yoghurt, cooked kohlrabi, cabbage, spinach, fennel, tinned salmon with bones, tinned mackerel with bones, almonds, hazelnuts, fat milk, Emmental cheese, Ricottagouda cheese, orange juice enriched with calcium, Parmesan cheese, lentils, dried figs, camembert, yolk, poppy seeds.

Na - Sodium

Sodium is the moist important cation of the extracellular fluid. It is accompanied by anions, usually chloride and hydrochloride. Hydrochloride anion is necessary for the regulation of acid-base balance. One of essential functions of sodium d maintaining normal osmolar pressure in body fluids. This protects the body from excessive fluids loss. Sodium is also important in maintaining normal excitability of muscles and permeability of membranes. Sodium and potassium regulate the metabolism of electrolytes and determine acid-base balance in the body, and play a key role in the conductivity of stimuli in all nervous cells.

Occurrence: bread, halibut, cod, turbot, milk not skimmed, olives, salted sticks, lettuce, broccoli, sardines in oil, celery, radish, Emmental cheese, Gouda cheese, Edam cheese, ham.

K - Potassium

Potassium is an intracellular ion, determining the water and electrolytes metabolism. It is necessary for the synthesis of proteins and metabolism of carbohydrates. It controls the normal function of nervous and muscular systems. Potassium is the most important intracellular ion. It plays a decisive role in heart muscle activity. Intracellular concentration of potassium is essential in many important metabolic functions, including the biosynthesis of proteins. Potassium and sodium control the electrolytes and acid-base balance, play the main role in conductivity of stimuli in all nervous cells. Potassium determines: proper oxygenation of the brain, function and transport to the cells, function of kidneys, water metabolism, normal heart activity, carbohydrates metabolism. Potassium is especially important in muscle fibres contractions, synthesis of proteins, glycogen and glucose metabolism.

Occurrence: avocado, bananas, broccoli, dried apricots, beetroots, wholegrain bread, beans, lima beans, dried cooked beans, cooked, soya beans, peas, skimmed yoghurt, pumpkin, cabbage, salmon, mackerel, cantaloupe melon, almonds, skimmed milk, dried mackerel, peanuts, pumpkin seeds, lettuce, celery, herring, snapper – south seas fish, fresh orange juice, tomato juice, asparagus, cooked spinach, prunes, cooked potatoes, baked potatoes.

P - Phosphorus

Phosphorus is present in every cell in the body, but about 80% of phosphorus is stored in bones in compounds with calcium. Phosphorus plays an important role ion the storage and transport of energy in the form of phosphate esters. The proportion of calcium to phosphorus in the diet influences the absorption and elimination of both these elements. If one of them is present in excess, elimination of the other increases. Phosphorus is necessary not only for energetic processes, but also in the formation of teeth and bones, acid-base balance. It is a component of phospholipids, which are material for brain and nervous cells construction, takes part in the synthesis of nucleic acids – DNA (deoxyribonucleic acid) and RNA (ribonucleic acid).

Occurrence: veal, milk chocolate, noodles, evaporated milk, nutsseeds, wheat bran and germ, trout, tuna, sardines in oil, Emmental cheese, Gouda cheese, Edam cheese, cheese spread, leguminous, plants, liver, brain, pork, beef, whole grains, yolk, sausages.

Zn - Zinc

Zinc plays a lot of important functions in the body,. It is a component of many enzymes, and their activation, takes part in the metabolism of proteins and carbohydrates, and possibly also lipids. Absorption of zinc by the human body differs depending on the food and interactions between zinc and other elements. Zinc plays an important role in the reproductive system, in particular in men, and acts as a detoxicant (antagonist of cadmium and lead). The antagonism Zn-Cd and Zn-Cu is especially metabolically important. Calcium and magnesium may also limit absorption of zinc. It is necessary for the synthesis of proteins, it is a component of digestive enzymes, participates in the storage of insulin and enhances the immune system functions. Zinc plays a role in maintaining the balance between other trace elements, such as manganese, magnesium, selenium and copper. Positive zinc effects include general improvement of metabolism, enhancement of wound healing, and in particular skin defects, improvement of mental abilities, protection of the macula lutea form degenerative changes.

Occurrence: veal, cooked meat, pumpkin and pumpkin seeds, lobster, baked turkey, cooked crabs, beef sirloin, nuts, seeds: pumpkin, sunflower; raw oyster without shell, smoked oyster, cheese, herring, cereal, wheat bran, beef, beef and pork liver, snails, cooked veal liver, eel, cereals, yolk.

Mg - Magnesium

Magnesium plays a role in various metabolic processes. It plays an important role in muscle contractions (including the heart muscle) – maintains normal heart rate and neuro-muscular excitability (antagonist of calcium). It enhances blood coagulation process (stabilises platelet and fibrinogen function). It stimulates immune reactions of the body, and normal development of the skeletal system, exerts a sedative effect. It is a microelement necessary for normal function of cells. Vitamin B6 (pyridoxine) increases the synthesis of GABA, which is a neurotransmitter, but also enhances absorption of magnesium from the alimentary tract. Due to synergistic activity of both components, the preparation eliminates anxiety (psychic or somatic), but does not affect learning and concentration. It prevents stress, headaches and other pains. Magnesium is necessary for normal metabolism of calcium and vitamin C. It influences the metabolism of sodium, potassium and calcium. Magnesium is necessary for the synthesis of proteins, protects capillaries form damage, takes part in the synthesis of numerous enzymes and plays a key role in energetic biochemical metabolism of carbohydrates. The above listed processes are impaired in magnesium insufficiency, which is the reason of many other metabolic dysfunctions, mainly affecting the muscle, including the heart muscle. Magnesium is also important in the prophylactics and treatment of many diseases. It prevents nervous hyperexcitability, depression and vegetative dystonia.

Occurrence: bananas, brewing yeast, beans, peas, buckwheat, cocoa, chocolate, crabs, almonds, brazilian nuts, nuts and seeds, hazelnuts,

walnuts, peanuts, chicken, cashew nuts, wheat bran, sausages, pumpkin seeds, soya products, sea fish, lentils, spinach, ham, soya, pork, beef, potatoes.

Fe - Iron

Iron is a part of many enzymes and metalprotein compounds, which take part in oxidation-reduction processes. It is the core of haemoglobin and myoglobin, and many other ferroporphyrins. Some part of iron is utilised by cells of the erythroblast system in the production of haemoglobin, the rest is stored as ferritin, mainly in the liver and spleen, and in other organs. The transporting protein for iron is transferine. Iron stored in the body is maintained in a dynamic balance with its amount in the serum. Iron reserves may be present in combination with hemosyderine, which, contrary to ferritin, shows weak ability to release iron and poor solubility. Iron is a component of erythrocytes, protein (haemoglobin) transporting the oxygen and protein storing the oxygen in muscle (myoglobin). Iron regulates: the activity of enzymes, the condition of erythrocytes, cellular respiration, normal heart function, cell divisions, hormonal metabolism, development of the muscles, condition of immune system, oxygenation of cells. Absorption and metabolic function of iron depend on other elements. Antagonistic activity towards iron is showed by cadmium (Cd), manganese (Mn), lead (Pb) and zinc (Zn). In case of copper the relation is more complex, often synergistic, as both elements are involved in oxidation-reduction processes. Phosphorus inhibits the absorption of iron, as iron phosphates easily sediment in various conditions.

Occurrence: wholegrain bread, peas, beans, lentils, mushrooms, mussels, meat e.g. sirloin, ham; nuts, dried fruit, pumpkin seeds, liver.

Cu - Copper

Copper is one of the most stable components of the human blood. Its serum concentration ranges within 100 - 130 mg/100 ml. It is slightly higher in women than in men. Copper, activating the enzyme necessary for the development of erythrocytes, determines the normal function of the haemopoietic system. It also controls – via the synthesis of dopamine - the development of the nervous system and – via the synthesis of collagen and elastin - the regeneration of the connective tissue. In addition, copper together with zinc repair the damage done by free oxygen radicals. Copper is a component and activator of enzymes in numerous chemical reactions. Copper is necessary for the absorption and metabolism of iron. It plays a part in the oxygenation of vitamin C. The main biological role of copper is that it is a component of different enzymes of oxygenation – reduction processes, for example cytochrom oxidase in animals. It also stimulates the activity of hemoglobin. Copper is a component of ceruloplasmine (serum protein). In this form it is transported around the body and regulates the metabolism and transportation of iron. It influences the metabolism of lipids (e.g. cholesterol) and determines the properties of myelin cover of nervous fibres. Copper is necessary for both normal metabolism of the connective tissue, and the functioning of brain cells. Deficit of copper affects the above described processes, which manifests as diseases - anemia, growth and fertility disorders, nervous system disturbances (headaches), circulatory system diseases, and also osteoporosis. In cells copper can be found mainly in mitochondria and nucleus. Its content in particular organelles also depends on the type of tissue. Due to its ability to make compounds with nucleic acids it can cause permanent changes of their structure, and thus change of their biochemical and genetic properties. Copper easily binds to various proteins, especially to macromolecular proteins and proteins containing sulphur. Metalothionine as a protein rich in sulphydryl groups shows large capacity in relation to copper is responsible to a considerable degree for its increased liver content.

Interactions between copper and various elements can lead to its secondary deficit or toxicity. The most common antagonism can be seen between copper and zinc (Cu-Zn), which is responsible for many symptoms connected with copper deficit. Relative increase in the content of zinc and increased elimination of copper causes various metabolic disorders, mainly abnormal metabolism of lipids, leading to coronary heart disease or mental disorders. In animals loss of equilibrium between copper (Cu) and molybdenum (Mo) is frequently observed, related to additional influence sulphur. Increased molybdenum content eliminates copper form metabolic cycle, leading to symptoms of copper deficit. The antagonism copper - molybdenum (Cu-Mo) is intensified by sulphur. Molybdenum increases the binding of copper into non-absorbable compounds. Synergism between copper and iron (Cu-Fe) is enhancing many enzymatic processes, and particularly for the synthesis of hemoglobin. Calcium positively affects the absorption of copper by the organism, even though in general the absorption of copper is better from foods of acidic pH.

Occurrence: mushrooms, meat, seeds, kidneys, nuts, dried fruit, tomatoes, wholegrain products, brown rice, liver, green leaf vegetables, potatoes.

Cr - Chromium

Chromium is indispensable for normal development of humans and animals. In general its content in diet and fodders covers the requirement, which for adults ranges from 50 - 200 mcg/day. Its daily dose consumed with food in Great Britain is estimated as 320 mcg, and in United States as 50 mcg, which may not cover the requirement. Chromium stabilizes the level of sugar in the blood. It lowers the level of cholesterol and triglycerides in the blood, controls the feeling of hunger, stimulates energetic transformations and synthesis of fatty acids. It stimulates the transport of aminoacids to cells and the activity of insulin via glucose level, and increases the tolerance to glucose. Chromium is commonly present in tissues, though in exceptionally small quantity. The content of chromium in the organism of an adult male is less than 6 mg. If its content in animal fodder is very low, growth and survival may be affected. These effects disappear if the diet is supplemented with 5 ppm of chromium. On the base of observation decreased glucose tolerance was seen in animals fed on diet poor in chromium; this symptom disappeared after administration of chromium. Chromium appears in animals at +3 and +6 degree of oxidation. Because of the tendency to reduction of chromium, cation Cr3+ prevails in the majority of tissues apart from the liver. Chromium binds to nucleic acids and is concentrated in liver cells. This metal plays an essential role in the metabolism of glucose, some proteins and lipids. It is a component of enzymes such as trypsine and stimulates the activity of other enzymes. In particular interesting and unexplained is its role in the metabolism of cholesterol. Increase of cholesterol in serum in older persons is supposed to be connected with a decrease of chromium content in the circulatory system, while the role of chromium in the metabolism of glucose is closely connected to the activity of insulin. Excessive consumption of sugars accelerates its elimination from the body. Elimination of Cr3+ is considerably smaller than C6+. Some illnesses, especially of the circulatory system, affect the metabolism of chromium.

Occurrence: black pepper, brewing yeast, grapefruit, mushrooms, artichoke, molasses, meat, nuts, seeds, peanuts, oysters, seeds, wholegrain products, wheat and bran, raisins, brown rice, asparagus, plums, veal liver, yolk.

Mo - Molybdenum

Molybdenum is classifies as one of the essential microelements, although no evident results of its deficit in humans were demonstrated. The concentration of this element in serum is 6,0 +/-2,2 μmol. Molybdenum is a component of the following metaloenzymes: xanthic oxidase, aldehyde oxidase, sulphite oxidase and other metaloenzymes participating in the metabolism of proteins, lipids and purines. The highest concentration of molybdenum in human organism was recorded in the liver and kidneys, bones and teeth.

Occurrence: brewing yeast, cauliflower, seeds, nuts, seeds, wholegrain and soya products, brown rice, lentils, spinach, leguminous plants, beef liver, green peas.

Co - Cobalt

Usual content of cobalt in the body is 18,7 μmol and its serum concentration 2+/-1 nmol/l. Daily requirement is below 10 μg (below 0,2 μmol). In humans cobalt appears mainly in form of vitamin B_{12}, the cofactor of two most important enzymes: methylmalonyl-CoA isomerase and ribonucleotide reductase. Vitamin B_{12} participates in the formation of coenzymes transporting monocarbonic fragments and incorporating them in newly synthesized purine and pirymidine compounds. Thus, the function of vitamin B_{12} (and indirectly of cobalt) is closely connected with the synthesis of nucleic acids.

Occurrence: vitamin B12, aloe.

Sr - Strontium

The role of this element is has not been fully explained. Strontium probably plays a role in the development of bones, and prevents caries. It probably is involved in energetic processes of in cells. The content of strontium in the blood is 0,4 +/- 0,1 umol/l.

Ni - Nickel

The concentration of this element in the blood is 82 +/- 22 nmol/l. In humans about 18 % of nickel is contained in the skin. Comparatively high concentration of nickel was also seen in bone marrow, lymphatic nodes, testes, and also in sweat, which is the route of elimination of this microelement. The role of nickel in the organism has not been fully explained. It is thought to play a role in the transport of oxygen to tissues, in the synthesis of enzymatic proteins, in the metabolism of carbohydrates, lipids and proteins, and synthesis of hormones. Rich sources of nickel are chocolate, cereals, fish, pulse crops germs. Deficit of nickel can be caused by dietetic errors and stress.

Occurrence: chocolate, crabs, seeds, nuts, wholegrain products, sea fish, leguminous plants.

Mn - Manganese

Manganese takes part in various physiological processes, mainly as an activator of enzymes regulating the metabolism of glucose and other carbohydrates, lipids including cholesterol and proteins. Manganese itself is not a component of these enzymes. Its function is not specific and it can be replaced by other metals, particularly by magnesium. One of the metaloenzymes containing manganese, carboxylase, can function also in connection with other metals. Manganese is an essential component of bones and is necessary for normal functioning of the central nervous system. Total content of manganese in the body is 12-20 mg. Main organs where manganese is stored are kidneys and liver. Manganese is one of the antioxidants. Its presence is necessary for the metabolism of vitamin B_1 and vitamin E. It activates some enzymes in the process of energy production, synthesis of glycogen, synthesis of urea and in coagulation and regeneration of the connective tissue. Manganese enhances the activity of magnesium in bones. Manganese replaces magnesium from its connections in enzymatic systems, but contrary to calcium and phosphorus it does not block these enzymes, but activates them even more than magnesium ions. Manganese as a catalyst takes part in the digestion of lipids and cholesterol. Manganese determines, among others: sexual activity, the pigment in hair, the activity of many enzymes and vitamins, functioning of pancreas. It affects the bones and teeth, participates in active cellular respiration, maintains normal level of sugars in the blood and collagen in tissues, participates in the production of hormones. The concentration of manganese in human tissues, particularly in the bones, decreases with age. Its deficit leads to bones deformations, growth disturbances and impairs co-ordination of movements (e.g. ataxia in animals). Fertility disorders connected with manganese deficit are secondary to abnormal synthesis of cholesterol and related compounds necessary for the synthesis of sexual hormones and other steroids.

Occurrence: avocado, pea, tea, barley, corn, almonds, olives, hazelnuts, walnuts, peanuts, oat, parsley, wheat, rice, sunflower, spinach, whole grain, sunflower seeds, potatoes, yolk, rye.

Se - Selen

Selen is an indispensable component of animal organisms and it is present in all cells. The highest content of selen is in the liver, kidneys, pancreas. Its biological function is mainly connected with glutathione peroxidase (GSHPx), of which it is a component. This enzyme plays a crucial role in the protection against membrane lipids oxidation and in the metabolism of hydrogen peroxide (H_2O_2) and lipid hydroxyperoxides. Selen activity in the blood is similar to that of vitamin E (alpha tocopherol), and selen may replace it in metabolic processes on the cellular level. As an antioxidant, selen protects cellular membranes from the generation of free radicals. Due to this it reduces the risk of cancer, diseases of the heart and blood vessels. Selen is indispensable for normal course of metabolism. It is very important for proper immunological function.. It is essential for the functioning of the immune system, normal growth, reproduction and in prevention of various illnesses. It plays an important role in the transmission of impulses in the central nervous system. Selen is prevalent in animal organisms. It is present in highest concentration in the cortical layer of kidneys, pancreas, pituitary gland and liver. Most of selen contained in the organism is labile. The content of selen in food is variable and dependent on the content of selen in the soil. Some diseases in animals developed on nutritional background react to the administration of selen or vitamin E, suggesting close relationship between these two components. Selen is regarded as a remarkably toxic element. If selen is present in diet in concentration about 5-15 ppm, it becomes highly toxic. However, in concentrations below 3 ppm selen accelerates growth and prevents many diseases. It appears often in compounds with aminoacids, cysteine (selenocysteine) and methionine (selenomethionine). The role of various, recently determined, compounds of selen with proteins has not been definitely established, but current investigations suggest its important role in RNA functions and in the activity of thyroid gland hormones, regulating the transformation of active and nonactive forms of iodothyronine. The content of selen in the blood of children is about 50 mg/l and is probably responsible for disturbances in the metabolism of thyroid hormones in girls. Bioavailabilioty of selen is individual and depends on the form in which it occurrs and type of food. Selenates and amine selene compounds are absorbed the most easily. Assimilation of selene is increased from protein rich diet and vitamin rich diet (mainly E, A, C), and difficult at increased quantity of heavy metals and sulphur. Deficit of selen is connected mainly with the heart muscle damage (Keshan disease) and diseases of the skeleton (Kashin-Beck disease). Recently numerous reports have suggested a relationship between the deficit of selen and development of neoplasms, and also with the diseases of circulatory system. A study comprising inhabitants of two neighbouring housing estates near Belgrade, with different cancer morbidity, showed that the soil, food and serum of inhabitants suffering form cancer contained significantly less amounts of this element (Se in serum: range 15,238, mean 26 mg/l) than those of healthy people, where the range of selen concentration was 20,6-69, average 39 mg/l. The concentration of selen in the serum of Poles is 50-60 mg/l, and in some regions it reaches even >100mg/l. Interactions between selen and trace metals are of physiological significance. Selen compounds of metals are easily formed in living organisms (e.g. Cd. Hg, Pb, Ag, Ta). Due to their poor solubility they do not participate in biochemical processes. As a result, selen can deactivate toxic excess of metals, which are deposited mainly in parenchymatous organs. The effect of selen on increased deposition of metals, particularly mercury and lead in the intracellular

substance in kidneys and liver can be harmful for general metabolism. As the above mentioned metals show a susceptibility to bind to low-molecular proteins, they limit the assimilation of selen by the organism. An increase of the content of this element in tissues (e.g. heart, liver, kidneys) causes secondary decrease in the concentration of magnesium, manganese and copper. Subcutaneous injection of selenate sodium solution caused essential decrease in the concentration of copper in the serum of sheep. Selen is a component of one of the thyroid hormones, which explains its synergistic function in relation to iodine. The presence of sulphur decreases toxic activity of selen.

Occurrence: garlic,brewing yeast, mushrooms, eggs, wheat wholegrain flour, mussels, molasses, meat, roasted sunflower seeds, brazilian nuts, cooked oysters, prepared wheat (blown), brown rice, cheese, shellfish, asparagus, tuna, liver, cooked poultry liver.

Li - Lithium

The concentration of lithium in the serum of healthy people reaches 10 μmol/l. Lithium salts are used in the treatment of affective disorders, especially in the prophylaxis of bi-phasic affective disease (and treatment of depression). During treatment the concentration of lithium in the blood should be maintained at therapeutic level 0,6 -1,5 mmol/l. Toxic concentration is over 2 mmol/l.

B - Boron

Boron is not classified as essential element for humans and animals. However, its positive effects on body functions make it necessary to determine its content in food and fodder. The physiological role of boron has not been fully explained. There are reports on its influence on the metabolism of calcium, phosphorus and fluorine. Boron is thought to increase the level of steroid hormones in humans, and thus affects the assimilation of calcium and prevents osteoporosis. Boron exerts positive effects in rheumatic diseases. Boron is easily absorbed both from the alimentary tract and respiratory system, followed by immediate increase of its concentration in kidneys, and also brain, liver and fatty tissue. Boron is not accumulated in the organism and it is quickly eliminated. It is present for the longest time in nervous cells. In liver kidneys and brain similar quantities of boron were seen.

V - Vanadium

The concentration of vanadium in the serum is 0,5+/-0,2mmol/l. The role of vanadium in human metabolism has not yet been established. Deficit of this element has been described in animals. The biological role of vanadium is connected with the metabolism of lipids, sugars and sodium-potassium and calcium– magnesium metabolism. Vanadium plays a key role in the processes of transformation of phosphates and production of erythrocytes.

S - Sulphur

Sulphur is a component of cysteine, cistine, methionine, taurin, glutathion, liponic acid, biotins, vitamin B1 and coenzyme A. Sulphuric acid synthesized in the body is used by the liver in the processes of detoxication of many metabolites and drugs (xenobiotics). SH groups participate in oxidation-reduction processes. Sulphur is a component of sulphatides and mukopolisaccharides. Twenty-four elimination of sulphur with urine, in the form of inorganic sulphides, esters of sulphuric acid and neutral sulphur (e.g. cysteine, cistine, taurin) is a marker of protein metabolism and can be used determine protein balance. Daily requirement of sulphur is closely connected with protein metabolism and vitamins: biotin (vit. H), thiamine (vit. B) and with liponic acid. Sulphur diminishes the toxicity of selen and is antagonistic in relation to heavy metals. Low proportion of sulphur to heavy metals (lead, mercury, cadmium, copper) signifies increased requirement of proteins containing sulphuric amino acids (cysteine, cistine, methionine). The content of sulphur in full blood is 38+/-l0 mmol/l, in plasma 24+/-l0 mmol/l and in erythrocytes 58+/-10 mmol/l. The content of sulphur depends on the quantity of consumed protein. Increased concentration of sulphur can be seen in kidney insufficiency, intestinal obstruction, leukaemias.

Al - Aluminium

So far aluminium compounds have been regarded harmless for health. Alkaline compounds of aluminium have been used in the treatment of hyperacidity, particularly in ulcerous disease. Aluminium is absorbed from the alimentary tract and accumulated in tissues. Increased content of aluminium in tissues is harmful for health. Symptoms of excessive aluminium accumulation in the brain tissue can lead to disturbances of memory and body balance. Aluminium decreases the activity of the central nervous system, binds with DNA of nervous cells, and blocks the most important enzymes of the central nervous system: Na/K ATP-ase and hexokinase, decreases reverse absorption of basic neurotransmitters in the brain: dopamine, noradrenaline, serotonine. Recent studies have revealed a relationship between aluminium accumulation and Alzheimer and Parkinson disease. Sources of aluminium are vegetables form acidic soils (in Poland about 60% of soils is acidic). Additionally this process is intensified at the deficit of magnesium and potassium in the soil. Aluminium appears in alkylating drugs containing its compounds, in tap water (if it contains increased quantities of aluminium), in bread with preservatives. Aluminium vessels can be a source of this metal.

Pb - Lead

Lead poisoning manifests as: lack of appetite, colics and cramps, arterial hypertension, nervousness. Lead blocks the enzymes participating in the synthesis of haemoglobin, accelerates destruction of erythrocytes, and incorporation of calcium into bone structure, which leads to their fragility. It blocks the enzymes of the central nervous system participating in the synthesis of neurotransmitters (nervous transmitters), affects the absorption of iodine indispensable for the normal function of the thyroid. Lead can enter the human body through the respiratory system and alimentary tract, and the degree of its accumulation is dependent on many factors, including individual properties and composition of food. Average intake of lead by adults estimated for various countries is 320-440 mg/day.

Cd - Cadmium

Practically cadmium is not present in the human body at birth, but accumulates gradually due to its exceptionally long half-time in the organism, possibly between 16 and 33 years. Generally the content of cadmium in the human organism is about 30 mg, from which 10 mg resides in the kidneys, and 4 mg in the liver. Studies conducted on animals revealed the presence of antagonism between cadmium and zinc, and interactions between cadmium, iron and copper. Poisoning with cadmium causes: bones deformations, growth disorders, infertility, neoplasms, skin tumors. Cadmium blocks the enzymes of Krebs cycle (cycle responsible for the production of energy), directly damages nervous cells, inhibits the release of acetylcholine in the central nervous system and accelerates its decomposition (activates cholinesterase). Cadmium affects the transformation of calcium and phosphorus in the bones – causes rarefication of the bones. It expels zinc from arterial walls, decreasing the elasticity of blood vessels, accelerates the development of atherosclerosis and hypertension. Cadmium is antagonistic to zinc, and impairs the synthesis of digestive enzymes and synthesis and release of insulin, requiring the presence of zinc. Cadmium impairs the activity of prostate gland, accumulates in the kidneys, affecting their hormonal and excretory function. At zinc deficit cadmium accumulates in the liver and kidneys. If this process is prolonged, it may lead to growth disorders and infertility, renal functions disorders and deformations of the skeleton. Absorbed cadmium (through the alimentary tract and partly via the respiratory system) creates complexes with proteins (e.g. low-molecular metalthionine), with which it is easily transported, and deposited mainly in the kidneys and liver. Cadmium is an inhibitor of phosphatase and

enzymes containing sulphydryl groups, causes disturbances in the metabolism of proteins and vitamin B_1. Interactions of cadmium with Zn, Cu and Se are based on mutual expelling from complexes with metalthionine. This is the reason why an increase of the content of these elements weakens toxic activity of cadmium. Antagonism cadmium/iron (Cd/Fe) is connected with the antagonism cadmium/calcium (Cd/Ca). It causes increased elimination of calcium. Resistance to toxic activity of cadmium is hereditary and it is connected with individual properties of metabolism.

Hg - Mercury

Poisoning with mercury manifests as: sight and consciousness disorders, states of confusion and disorientation, frequent lapses of memory, nervousness. About 10 % of mercury introduced into the organism with food, through the skin and lungs gets to the brain and accumulates there. It expels zinc from the brain tissue, and it penetrates to cellular nuclei and destroys the genetic material.

Ba - Barium

Barium content in human blood is 0,5 -2,4 μg/l. Barium accumulates mainly in the bones (70 μg/g). This element can be extremely toxic if present in the form of compounds easily soluble in water: barium chloride $BaCl_2$, barium nitrate $Ba(NO_3)_2$ or barium carbonate $BaCO_3$. Compounds not easily soluble in water, such as barium sulphate, are not harmful for humans and they are used in radiology as the so-called barium meal for stomach and intestines X-rays. Toxic dose for humans is 200 mg of barium, and daily intake with food about 600-750 μg. High concentration of barium in water is connected with hypertension and heart diseases. Barium poisoning in the first stage manifests as gastrointestinal disturbances, then muscular paresis, especially of the upper limbs and neck, also difficulties in breathing. Barium also inhibits the process of bone mineralisation, where it easily deposits. The mechanism of toxic activity of this element is expelling potassium and binding sulphate ions.

Si - silicon

In natural environment, it can be found mainly as silicon dioxide and silicates. Silica occurs very often in the environment, mainly in the form of sand. Apart from carbon, silicon is the basic element of life. In the form of orthosilicic acid, it is essential for the correct functioning of human body. Human body contains app. 6-7g of Si. It is excreted with urine, in combination with calcium and magnesium cations. Properties. Silicon is an element of many changes concerning many other elements. It supports transformations of calcium, magnesium, phosphorus, copper, zinc, and sulphur. It competes with aluminium, cadmium, lead, mercury, chromium, strontium, and potassium. Silicon assists in the excretion of toxic substances from cells. It is found mainly in the connective tissue (e.g. in sinews, cardiac valves, skin, mucuous membranes, and blood vessel walls) and in bones. Thanks to silicon, people have fit joints, strong bones, and the efficient cardiovascular system. Silicon enhances protective properties of the body against infections. It assists in regeneration of skin, improving its general appearance. It limits hair loss, accelerates hair growth, and strengthens nails. It inhibits premature ageing. As an aluminium antagonist, silicon may reduce risk of the Alzheimer disease. Deficiency. Silicon is the most important element in the synthesis of mucopolysaccharides in the creation of cartilaginous tissue; it is also essential for correct production of collagen. It has been demonstrated that deficiencies of silicon in children reach even 50% nowadays. This creates favourable conditions for the development of rickets, skin diseases, and disorders in the development of the lymphatic system.

Dose. Human body needs 20-40 mg of silicon daily. Higher doses are required by pregnant women, people after bone surgeries, and elderly people.

Occurrence. In food, silicon occurs in the form of orthosilicic acid. It can be found in oats, millet, and barley, mainly in bran and grain husks. Lots of silicon can be found in field horsetail. There is hardly any silicon in products manufactured based on refined flour. Semolina, which is intended mainly for children, does not contain this element either.

Thallium (Tl)
is a naturally occurring trace element. It is commonly found in the Earth's biogeosphere, but in very low concentrations. It has no known biological use and is not an essential element for life. It is considered one of the most toxic heavy metals. Occasionally, there are reports of thallium poisoning as a result of suicide, attempted murder or accident. The main risks to humans are occupational exposure, environmental contamination and accumulation in food, mainly in vegetables grown on contaminated soil. The increasing use of new advanced material technologies, using rare-earth metals such as thallium, could pose a potential threat in industrial zone regions. Thallium is considered a cumulative poison in the body. It can cause adverse health effects and degenerative changes in many organs. Once in the human body, thallium has the fastest and most destructive effect on the nervous system. Thallium accumulates in the kidneys and, above all, in the hair. The exact mechanism of thallium toxicity is still unknown. Thallium is thought to degrade glutathione metabolism, potentiating oxidative stress. Thallium directly disrupts potassium homeostasis.

Thallium poisoning causes:

- In the digestive system: nausea, vomiting, diarrhoea (even bloody), ulcers;
- in the nervous system: paresis of the limbs, hypersensitivity to touch, convulsions, dyskinesia, facial muscle paresis, drooping of the eyelids, sphincter paralysis, memory disorders, ataxia, epileptic seizures;
- On the skin: rash on the face, loss of eyebrows, hair, striations on the nails;
- respiratory failure.

The best method for detecting thallium in the body is hair analysis using inductively coupled plasma mass spectrometry (ICP-MS).

Gold (Au)
is ubiquitous in the human environment. Many people come into contact with gold when wearing jewellery and through the use of dental implants, rheumatoid arthritis treatments and cosmetics. No acceptable daily intake has been established for gold. Gold is not a nutrient. In the European Union, gold is used as a food colouring.

Gold can enter the human body through the digestive system, either as gold nanoparticles or in the form of gold ions. Gold goes to the liver, heart, kidneys and lungs. It is mainly excreted in the urine.

Gold intake levels in the EU have been determined to be between 10 and 14 ng/kg body weight/day. The gold content in the human body ranges from undetectable to 3 μg/kg by weight. Gold does not accumulate in the human body.

Gold nanoparticles from cosmetic creams can enter the body through the skin. They penetrate the epidermis, dermis and subcutaneous layer after 10 days of exposure, but cannot enter the systemic circulation. Creams containing Au nanoparticles reduce skin discolouration (gold reduces the viability of keratinocytes and fibroblast cells) and inhibit hair growth.

In many people, metallic gold causes allergic contact hypersensitivity. White gold jewellery can cause allergic reactions because it contains other metals such as nickel, chromium and copper. The toxicity of gold is very low. The occurrence of skin rashes in humans following the consumption of alcoholic beverages containing gold has been reported in the literature. Gold released from dental fillings increases the risk of gold hypersensitivity.

Based on the literature and considering the low human exposure to gold, it is considered that elemental gold administered orally does not pose a risk to human health

The use of gold in the form of nanoparticles in anticancer therapies and diagnostic medicine represents the main risk of gold toxicity. The toxicity of gold depends on the size of the nanoparticles, the application area, the amount administered, the rate of distribution and accumulation in tissues. Gold nanoparticles are attracting increasing interest due to their potential use as inert carriers for medical purposes.

Germanium (Ge)
is present in all living plant and animal organisms in microscopic amounts. It is recognised as an essential trace element that is necessary for the proper functioning of the immune system and plays a significant role in cancer prevention. Germanium is ubiquitous in mammalian organs and tissues, with the highest concentration in the thymus gland. Germanium affects many physiological functions, especially blood profiles, including pH, glucose, minerals, cholesterol, uric acid, haemoglobin and leukocytes. Germane deficiency can result in a number of diseases, primarily cancer. Cancer patients have abnormally low serum germanium levels. In addition, germanium levels in tumour tissues are significantly lower than in neighbouring healthy tissues.

Germanium has the following therapeutic properties:

- strengthens immunity,
- facilitates oxygenation of the body and normalises intracellular respiration (i.e. oxidative phosphorylation), which may delay tumour growth,
- supports the antioxidant barrier,
- has an analgesic effect,
- facilitates the detoxification of heavy metals,
- increases the efficiency of certain enzymes, e.g. aldehyde reductase, protecting against the formation and development of cataracts,
- protects against the development of arthritis and osteoporosis,
- supports the treatment and/or prevention of AIDS.

Germanium mainly obtained through the consumption of plant-based foods. The average daily intake of germanium by humans is 0.4-1.5 mg. Germanium compounds found in natural sources have long been recognised as a therapeutic agent with anticancer, antiviral and anti-inflammatory effects. The highest concentrations of germanium are found in ginseng, saprophytic fungi (e.g. Ganoderma lucidum), garlic, aloe vera and echinacea.

Beryllium (Be)
is a hard, lightweight metal with a steel-grey colour. Beryllium is one of the least common lighter elements in the Earth's crust. It occurs naturally in the minerals bertrandite and beryl.

Most beryllium is mined in the United States, China and Kazakhstan. It is mainly used in the aerospace and electronics industries due to its high corrosion resistance and light weight.

Beryllium often occurs as a divalent cation, but due to its small size and high charge density, it forms complexes that have significant biological activity.

Beryllium has no useful function in the human body. Beryllium has no known beneficial health functions, i.e. beryllium is not needed for the functioning of the human body. The absence of beryllium in the body does not cause any symptoms or effects.

Beryllium is toxic to humans, animals and plants alike, and soil contamination can lead to metabolic disruption of all living organisms. The toxicity is likely due in part to Be's ability to compete for Mg and Zn binding sites in enzymes and its ability to catalyse structural changes in cell surface polysaccharides and glycoproteins.

In large quantities, it is toxic and can lead to serious illnesses. Inhalation of dust (2.8 ppm) containing beryllium compounds under industrial conditions can result in pneumonia (berylliosis - chronic beryllium disease), which may lead to lung cancer. The main risk from beryllium relates to occupational contact, while it is not commonly present in food.

The vast majority of people are not at risk of beryllium poisoning through diet. The main risk of exposure to beryllium is for those working in the mining or processing of this element.

As beryllium is a toxic element, an excess of it in the body can lead to serious health problems. Symptoms of excess beryllium include:

- coughing and difficulty in breathing,
- chest pain,
- tiredness and weakness.

In the event of overexposure to beryllium, immediate medical advice and elimination of the source of exposure is required.

DIARY

Dear Patient, for better control of the organism's condition during the recommended 30-day nutrition program, we suggest completing the attached on the next side table every day .In the table, you enter the weight and well-being. In the second part of the page there is your supplementation program (part one - nutritional program). You can print it and always have it with you.
We would like to remind you that only following the whole program, consisting of the recommended diet, supplementation and physical activity will enable you to attain the optimal health condition.
Measure yourself, please and record the measurement results:

Before the 30 – day program	**After the 30 – day program**
Weight= ..... kg	Weight= ..... kg
Measurement values= ..... cm	Measurement values= ..... cm
Chest circumference= ..... cm	Chest circumference= ..... cm
Waist circumference= ..... cm	Waist circumference= ..... cm
Hip circumference= ..... cm	Hip circumference= ..... cm

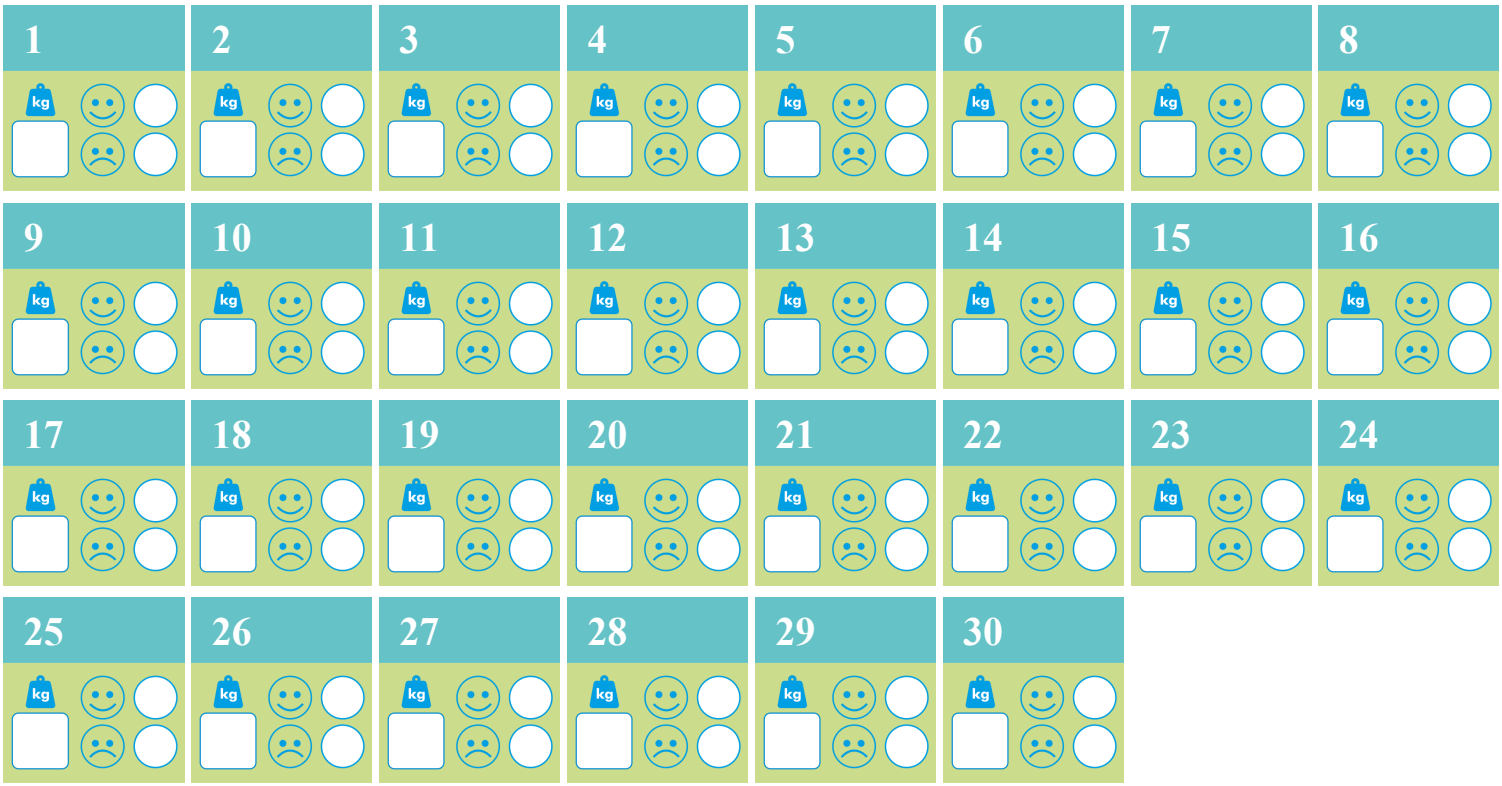
Note
Check your weight in the morning, before eating, after urinating, with no clothes on.

Record the subjective assessment of your condition every evening: **1 - good, 0 - bad.** After completing the table, all the data in the SUBJECTIVE CONDITION column should be summed up.

Subjective condition: 30 - 15 score:
Congratulations! Your health and psychosomatic condition is good. The second part of the supplementation program should stabilize good health tendencies. If your subjective condition remains good during te second part of the program, then you can undergo Nutritional Status Diagnostics (NSD) within the next two years (from the date of the first Elemental Hair Analysis).

Subjective condition: 14 - 8 score:
Regular use of the first part of the supplementation program for a further month is recommended. More attention should be paid to appropriate diet and physical activity. If the psychosomatic condition is good during the second part of the program, Nutritional Status Diagnostics can be performed within the next 2 years (from the date of the first Elemental Hair Analysis.

Subjective condition: 7 - 0 score:
Continuation of the first part of the supplementation program for further 3 months is necessary. More attention should be paid to the diet . Regular physical activity is necessary. A medical consultation and control examinations are recommended.



Supplement	morning	afternoon	evening
Lactobacillus acidophilus - Lactobacillus plantarum every two days, for one month	1 before meal	0	0
INUBIOTYK® MAŚLAN https://biomol.online/ every day, for one month	2 after meal	2 after meal	0
Vit. C 240 mg from acerola and citrus every day, for one month	2 before meal	2 before meal	0
B-complex (100% DRV) every day, for one month	3 after meal	3 after meal	0
Calcium 200 mg + Magnesium 100 mg every day, for one month	0	0	1 after meal
Magnesium 200 mg every day, for one month	1 after meal	1 after meal	0
Selenium 50 mcg every day, for one month	1 after meal	0	0
Zinc 15 mg every day, for one month	0	0	1 after meal
Chromium 100 mcg every day, for one month	0	1 after meal	0
Omega-3 (EPA 180 mg, DHA 120 mg) every day, for one month	0	1 30 minutes before meal	1 30 minutes before meal
OLIOBIOTYK FOR MEN every day, for one month	0	1 With lunch	0
BETA CAROTENE 7MG every day, for one month	0	0	1 after meal
Lipoic acid 300 mg every day, for one month	1 after meal	0	0
Garlic 400 mg every day, for one month	2 after meal	0	2 after meal
CURCUMIN 400mg	2	2	0

every day, for one month	after meal	after meal	
Glucosamine 250 mg + Boswellia every day, for one month	1 after meal	0	1 after meal
Lecithine 1200 every day, for one month	0	0	1 after meal
L-ORNITHINE 500MG every day, for one month	0	1 after meal	0
Silymarol (extract from milk thistle) 70 mg every day, for one month	0	0	1 after meal
Vitamin D3 2000 IU + K2 50 mcg every day, for one month	0	1 30 minutes before meal	0

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