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External ID

Name		Date of Birth		Order ID	
First Name		Sex	Male	Order Date	03.11.2023
Sampling Date	02.11.2023 09:30	Validation by		Findings Status	**Final Report**
Sample Material	CPDA, E, H, NAF, S, U	Validation Date	10.11.2023	Findings Date	13.11.2023

Test	Result	Unit	Standard Range	Previous Result	Material / Method
Orthomolecular and Mitochondrial Medicine					
Whole blood mineral analysis max.					
Whole-Blood Mineral Analysis					
Whole-blood Mineral Analysis Parameters					
Sodium	1912	mg/l	1900 - 2050		H A) ICP-MS
Potassium	**1695**	mg/l	1750 - 1900		H A) ICP-MS
Calcium	58,4	mg/l	57 - 61		H A) ICP-MS
Magnesium	**34,6**	mg/l	35 - 39		H A) ICP-MS
Copper	0,90	mg/l	0,85 - 1,05		H A) ICP-MS
Iron	**443**	mg/l	460 - 515		H A) ICP-MS
Zinc	**7,7**	mg/l	7,0 - 7,6		H A) ICP-MS
Selenium	**163,52**	µg/l	100 - 140		H A) ICP-MS
Whole-Blood Mineral Analysis Parameters (corr.)					
Sodium (corr.)	**1883**	mg/l	1900 - 2050		H A) RECHN
Potassium (corr.)	**1729**	mg/l	1750 - 1900		H A) RECHN
Calcium (corr.)	57,55	mg/l	57 - 61		H A) RECHN
Magnesium (corr.)	**34,95**	mg/l	35 - 39		H A) RECHN
Copper (corr.)	0,89	mg/l	0,85 - 1,05		H A) RECHN
Iron	**443**	mg/l	460 - 515		H A) ICP-MS
Zinc (corr.)	**7,9**	mg/l	7,0 - 7,6		H A) RECHN
Selenium (corr.)	**166,86**	µg/l	100 - 140		H A) RECHN

Selenium consumption in Central Europe is low in worldwide comparisons. The normal range stated here is a statistic average. It does not represent physiologically desirable limits. Maximum activity of the selenium-containing enzyme glutathione peroxidase is reached at whole-blood selenium concentrations of 140 – 160 µg/l.

preventive medical optimal range			140 - 160	
Potassium/sodium quotient	0,92		0,87 - 0,97	H NA) RECHN
Magnesium/calcium quotient	0,61		0,58 - 0,66	H NA) RECHN
Potassium/calcium quotient	30,05		29,5 - 32,5	H NA) RECHN
Copper/zinc quotient	**0,11**		0,125 - 0,155	H NA) RECHN

CPDA=CPDA, E=EDTA, H=Heparin, NAF=NAF, S=Serum, U=Urin

* cooperate analytics (R), A) accredited, NA) not accredited

Name		Date of Birth		Order ID	
First Name		Sex	Male	Order Date	03.11.2023

Test	Result	Unit	Standard Range	Previous Result	Sample Material / Method
Whole Blood Mineral Analysis Further essential elements					
Boron	29,29	µg/l	22 -88		H NA) ICP-MS
Chromium	0,55	µg/l	0,27 - 1,0		H A) ICP-MS
Cobalt	0,44	µg/l	0,08 - 0,7		H NA) ICP-MS
Iodine	**26,4**	µg/l	30 - 63		H NA) ICP-MS
Molybdenum	**0,31**	µg/l	0,35 - 1,05		H NA) ICP-MS
Phosphorus	**349,96**	mg/l	365 - 405		H A) ICP-MS
Manganese	9,37	µg/l	6,5 - 14		H A) ICP-MS
	preventive medical optimal range		10 - 16		
Whole Blood Mineral Analysis Potential toxic elements					
Aluminium	<4,0	µg/l	< 11		H NA) ICP-MS
Arsen	**2,33**	µg/l	< 2		H NA) ICP-MS
Lead	12,99	µg/l	< 28		H NA) ICP-MS
Cadmium	0,20	µg/l	< 0,6		H NA) ICP-MS
Nickel	<0,25	µg/l	< 0,5		H NA) ICP-MS
Mercury	1,22	µg/l	< 1,7		H NA) ICP-MS
Thallium	0,02	µg/l	< 0,1		H NA) ICP-MS
Vanadium	0,03	µg/l	< 0,1		H NA) ICP-MS
Tin	<0,10	µg/l	< 0,30		H NA) ICP-MS

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Micronutrients

Minerals and Trace Elements

Sodium

The sodium level in whole-blood is within sub-optimal range.
Sodium is the largest electrolyte of the extracellular space and serves for the maintenance of the osmotic pressure. Furthermore it is essential for membrane potential and impulse conduction of nerves. Relevant sodium deficiency, however, is relatively rare as normal diets cover the sodium consumption well by cooking salt.

Possible causes of a deficiency, however, may be:

- very salt-poor diet
- severe sweating
- competitive sports
- persistent diarrhoea
- iatrogenic applications
- low sodium liquids and infusions for rehydration in case of isotonic dehydration
- Addison syndrome
- Long-term diuretic therapies

Possible symptoms of sodium deficiency are:

- hypotonia
- syncope
- dizziness
- weak muscles but also cramps
- nausea

Potassium

The potassium level in whole-blood is slightly reduced.
Potassium is the quantitatively largest electrolyte within the intracellular space and relevant for the maintenance of membrane potential and osmolarity in the ICR. Furthermore, it is important for impulse generation and transmission in nervous system, musculature and especially in the heart.
For the diagnostics of potassium deficiency, the whole-blood mineral analysis is by far better than serum determination, as 90 % of the potassium occurs intracellular and the serum potassium level can be maintained via the depletion of the intracellular storage.

Causes of potassium deficiency may be:

- persisting diarrhoea
- laxative abuse
- loop diuretics
- thiazide diuretics
- severe sweating
- competitive sports
- glucocorticoid
- endocrinologic disorders like Conn or Cushing syndrome
- liquorice abuse
- alcoholism and of course
- lacking consumption with food

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Possible symptoms of potassium deficiency are:

- hypertonia
- cardiac arrhythmia (i. e. VES)
- nervousness
- muscle weakness
- paraesthesia
- migraine or tension headache
- constipation

Magnesium

The magnesium level in whole-blood is within sub-optimal range.
Magnesium like potassium occurs mainly intracellular. Magnesium has many functions in the body, among others in the nervous system, the cardiovascular system and metabolism.

Causes of magnesium deficiency may be:

- Malnutrition
- chronic diarrhoea
- reabsorption disorders
- hormone disorders
- severe sweating
- competitive sports
- renal losses or
- severe stress

Possible symptoms of magnesium deficiency are:
headaches

- nervousness
- bad temper
- Fear
- muscular tension
- cramps in the calf
- constipation
- cardiac arrhythmia (before all extra-systoles)
- hyperreflexia
- tremor

Iron

The iron level is within sub-optimal range.
Iron is a major component of haemoglobin und therefore essential for oxygen transport. Furthermore iron is relevant for numerous enzymes as well as for the respiratory chain. The iron determined in the whole blood analysis corresponds to 99 % with the haemoglobin iron. For this reason the whole blood iron value is not suitable for early detection of iron deficiency. For this purpose transferrin saturation and/or ferritin in serum should be determined.

Causes of iron deficiency maybe:

- vegetarian diets
- consuming a lot of coffee or tea
- increased demand during pregnancy and breastfeeding
- high-performance sports
- resorption disorders or

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- long-term intake of competing micronutrients (i.e. calcium, zinc) as well as
- taking tetracycline or NSAID over a longer period of time

Possible symptoms of iron deficiency are:

- fatigue
- weak performance
- headaches
- hypochromic anaemia
- restless legs

Note: *We are pleased to inform you that the normal ranges of iron in whole blood have now been adjusted for gender, as is already common for many other parameters.*

Iodine in Whole Blood

Iodine deficiency was detected.
The body needs iodine mainly for the biosynthesis of the thyroid gland. Iodine deficiency is usually caused by insufficient intake with food, as the soils in Germany are relatively poor in iodine. In addition, iodine deficiency can also be caused by high consumption of cabbage, cress and beetroot species, because they inhibit the iodine uptake.
Environmental pollutants (PCBs, dioxins, herbicides), lithium salts, nitrates, perchlorates, sulphonamides, sulphonylureas, benzoic acid and hydroxybenzoic acid also have an influence on the iodine level.

The consequences of an iodine deficiency are:

- Initially, goitre formation of the thyroid gland
- Long-term deficiencies lead to synthesis disorders of T3 and T4
- regulatory TSH increase and
- risk of hypothyroidism

During pregnancy, iodine deficiency can lead to severe disorders of fetal development.
Children, adolescents, pregnant women, nursing mothers and women in the menopause need a higher iodine supply. This depends on age, the daily requirement of an adult is ~180 - 200 µg. Sea fish, other marine animals, iodized table salt but also some types of milk contain a high iodine content.

Molybdenum

The molybdenum level in whole blood is reduced.
Molybdenum is an essential trace element and cofactor of various enzymes. As a component of the sulphite oxidase, it supports, amongst other, the conversion from cysteine to glutamine and as cofactor of the xanthine oxidase the production of uric acid in the liver as well as the iron transport and storage. The frequent consumption of industrially processed food, an unbalanced diet, chronic inflammatory bowel diseases (e.g. Crohn's disease), parenteral feeding for a longer period as well as high copper supplementation can cause molybdenum deficiency. Possible symptoms are fatigue, night blindness, confusion, hair loss, caries and kidney stones. Long-term deficiency has been associated with esophageal cancer. Recommended molybdenum-rich foods are: Legumes, soybean meal, spinach, liver, wheat germ, cereals, garlic, cauliflower, red cabbage, beans, peas, potatoes and eggs. In addition, alkaline powder (to restore acid alkaline balance) may help to increase the absorption. **General therapy recommendations:** Molybdenum, alkaline, taurine (due to increased excretion)

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Phosphor

Phosphor is decreased.
Phosphor is an important mineral and, among other things, it is involved in the acid-base balance as buffer, in building cell walls, in bone and tooth metabolism and in energy production. It's mainly contained in nuts, legumes, meat, eggs, cheese, yeast and whole grains. Low phosphorus levels can occur due to unbalanced, denatured diet, renal dysfunction, high sugar consumption (mainly fructose), high alcohol consumption, aluminium exposure, malabsorption, pseudohypoparathyroidism and antacids. A deficiency of vitamin D3 and magnesium or too high calcium, zinc and iron amounts correlate also with a phosphorus deficiency. Possible symptoms: growth disturbances and bone softening in children, tiredness and exhaustion, confusion, disturbance of the heart rhythm, bone and muscle pain, hypoventilation, epileptic attacks.
General therapy recommendations: Phosphate, lecithin, vitamin D, magnesium

Zinc

The zinc level is slightly increased.
The micronutrient zinc is required as co-factor for more than 200 different enzymes – e.g., for:

- anti-oxidative enzymes like superoxide dismutase
- alkaline phosphatase or
- enzymes of the protein or carbohydrate metabolism

From an immunological point of view zinc:

- promotes the maturation of T-lymphocytes
- inhibits release of histamine and
- blocks the replication of some viruses, i.e., Herpes simplex viruses
- increases the phagocytosis activity of granulocytes and macrophages
- supports the activation of the complement system

In most cases slightly increased zinc levels are not problematic, nevertheless the renal functions should be checked and if required an ongoing substitution should be stopped.

Manganese

The manganese level in whole-blood is within sub-optimal range (< 10 µg / l).
Manganese is:

- a component of the anti-oxidative enzyme superoxide-dismutase
- important for blood sugar regulation and
- involved in bone and cartilage regeneration

Manganese also occurs in an enzyme of the citric acid cycle and at various positions of the amino acid metabolism.

Possible causes of manganese deficiency are:

- alcohol abuse
- high carbohydrate consumption
- oxidative stress
- long-term intake of other bivalent metals (e.g., iron, copper or zinc)
- gastrointestinal resorption disorders

Possible consequences of manganese deficiency are:

- disordered glucose tolerance
- fat metabolism disorders
- bone and cartilage damages

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- osteoporosis
- dermatitis
- spermatogenesis disorders
- clotting disorders
- increased alkaline phosphatase

Chromium

The measured chromium value is within the normal range.
Chromium is an essential trace element and relevant for glucose homoeostasis and fat metabolism.

Increased demands occur in case of:
- athletes
- people suffering from diabetes
- high consumption of simple carbohydrates
- prolonged infections
- parenteral diets

Symptoms of inadequate chromium supply are:
- diabetes hard to adjust
- tendency to hypoglycaemia (!)
- peripheral neuropathy
- fat metabolism disorders

Selenium

The selenium level is increased.
The micronutrient selenium occurs physiologically in anti-oxidative enzymes like glutathione peroxidase and therefore is an important component of anti-oxidative therapy regime. Immunologically selenium leads to an increased release of interferon gamma and therefore to a shift of the TH1 / TH2 balance in direction TH1; furthermore selenium in its preventive medical range activates cytotoxic T-cells and natural killer cells.

Increased selenium levels are practically always caused by too high selenium intake. While levels of up to 160 µg / l are considered to be optimal, the selenium dosage should also be reduced in case of increased selenium demand. Too high selenium levels may have a toxic effect.

For levels between 160 and 250 µg / l one has to decide individually if the dose is to be maintained or if the selenium intake is reduced respectively stopped. If selenium therapies are continued, the selenium level has to be checked regularly.

Arsenic

The arsenic level is above the normal range.
In the past, arsenic compounds have been used in medicine. Today, they are used, amongst other, in tobacco, plant protection (residues in fruits, vegetables and wine), metal, glass, and colour industry. Depending on the region, there are high arsenic levels in e.g. water, fishes, meat and rice. Arsenic inhibits the body's own detoxification, DNA-repair and mitochondria functions, interferes with the maturation of lymphocyte and in the long term it causes leukopenia and anemia. The acute intoxication is manifested by severe gastrointestinal symptoms, followed by cramps, visual disturbances, impaired consciousness and hyperthermia. In case of chronic intoxication, hair loss, skin and mucosa damages, muscular atrophy, exhaustion, diarrhoea, cardiovascular complaints as well as liver damage and kidney failure are possible. Characteristic are Mees' lines in fingernails (white lines across the nails) as well as the breath smelling of garlic. Arsenic and lots of arsenic compounds are recognized as carcinogenic (mainly bladder cancer). In therapy, the elimination of arsenic

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sources has priority. In severe cases, a chelation therapy might be necessary. Sulphur-containing amino acids (e.g. legumes) enhance the body's own detoxification.
General therapy recommendations: Vitamin C, selenium, methionine, folic acid, vitamin B12

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Therapy Recommendation

Oral Therapy

Substance	morning	noon	evening	night
Iodine	__ µg			
Potassium	__ mmol			
Magnesium			___ mmol	
Manganese	__ mg			

With kind regards

Your Biovis-Diagnostik

Attention: *The recommendations given are only advice based on the compiled findings and possible clinical information. They are exclusively addressed to the therapist/physician and are* ***not intended*** *for direct transfer to the patient. They cannot replace diagnosis and therapy of the treating therapist. The recommendations for therapy are a suggestion. The responsibility for the final selection/measure/dosage lies with the medical professional/therapist responsible for each individual case. Please also note that there may be contraindications/interactions associated with the recommended medication/nutritional supplements for pre-existing primary diseases and when taking certain medication. These must be investigated by the medical professional/therapist before starting therapy.*

To achieve a special medical purpose, the dosing recommendations for individual substances may be higher than those of EU Regulation 2016/128.