

External ID

Name	Muster	Date of Birth	15.09.1966	Order ID	11631156
First Name	Muster	Sex	Female	Order Date	23.11.2018
Sampling Date	23.11.2018 00:00	Validation Date	Thomas Gugerel	Findings Status	Final Report
Sample Material	E, H	Validation on	27.11.2018	Findings Date	27.11.2018

Test	Result	Unit	Standard Range	Previous Result
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Orthomolecular and Mitochondrial Medicine

Vollblutmineralanalyse Maxi

Whole-Blood Mineral Analysis

Whole-blood mineral analysis parameters (updated)

Sodium	1815	mg/l	1900 - 2050		H A) ICP-MS
Potassium	1814	mg/l	1750 - 1900		H A) ICP-MS
Calcium	55,7	mg/l	57 - 61		H A) ICP-MS
Magnesium	35,5	mg/l	35 - 39		H A) ICP-MS
Copper	0,91	mg/l	0,85 - 1,05		H A) ICP-MS
Iron	452	mg/l	460 - 480		H A) ICP-MS
Zinc	6,4	mg/l	7,0 - 7,6		H A) ICP-MS
Selenium	115,58	µg/l	100 - 140		H A) ICP-MS

Whole-Blood Mineral Analysis Parameters - Blood Count - Adapted

Sodium BB	1831	mg/l	1900 - 2050		A) RECHN
Potassium BB	1794	mg/l	1750 - 1900		A) RECHN
Calcium BB	56,19	mg/l	57 - 61		A) RECHN
Magnesium BB	35,28	mg/l	35 - 39		A) RECHN
Copper BB	0,92	mg/l	0,85 - 1,05		A) RECHN
Iron BB	445,6	mg/l	460 - 480		A) RECHN
Zinc BB	6,3	mg/l	7,0 - 7,6		A) RECHN
Selenium BB	114,32	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

Whole-Blood Mineral Analysis - Blood Count - Adapted

Potassium/sodium quotient BB	0,98		0,87 - 0,97		NA) RECHN
Magnesium/calcium quotient BB	0,63		0,58 - 0,66		NA) RECHN
Potassium/calcium quotient BB	31,93		29,5 - 32,5		NA) RECHN
Copper/zinc quotient BB	0,15		0,125 - 0,155		NA) RECHN

Small Blood Count VMA

Erythrocytes	4,99	Mio/µl	3,8 - 5,0		E A) PARTZ
Haemoglobin	14,20	g/dl	11,6 - 15,1		E A) PHOT
Haematocrit	0,44	l/l	0,34 - 0,44		E A) RECHN

Test	Result	Unit	Standard Range	Previous Result
Vollblutmineralanalyse Weitere essentielle Elemente				
Bor	<10	µg/l	22 - 88	 H NA) ICP-MS
Chromium	<0,25	µg/l	0,5 - 3,9	 H A) ICP-MS
Cobalt	0,14	µg/l	0,06 - 0,4	 H NA) ICP-MS
Molybdän	0,54	µg/l	0,35 - 1,05	 H NA) ICP-MS
Phosphor	360,35	mg/l	365 - 405	 H A) ICP-MS
Manganese	8,09	µg/l	6,5 - 14	 H A) ICP-MS
preventive medical optimal range			10 - 16	

Vollblutmineralanalyse Potentiell toxische Elemente				
Aluminium	<4	µg/l	< 11	 H NA) ICP-MS
Antimon	1,06	µg/l	< 3,0	 H NA) ICP-MS
Arsen	5,46	µg/l	< 2	 H NA) ICP-MS
Lead	14,42	µg/l	< 28	 H NA) ICP-MS
Cadmium	0,34	µg/l	< 0,6	 H NA) ICP-MS
Nickel	0,33	µg/l	< 0,5	 H NA) ICP-MS
Quecksilber	1,36	µg/l	< 1,7	 H NA) ICP-MS
Thallium	0,03	µg/l	< 0,1	 H NA) ICP-MS
Vanadium	0,03	µg/l	< 0,1	 H NA) ICP-MS
Zinn	1,91	µg/l	< 0,30	 H NA) ICP-MS

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STEF

Micronutrients

Minerals and Trace Elements

Sodium

The sodium level in whole-blood is reduced.

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 and
- Long-term diuretic therapies.

Possible symptoms of sodium deficiency are:

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

Calcium

The calcium level is within sub-optimal range.

Aside from its significance for inorganic components of bones and teeth calcium also plays a role in the area of blood clotting (factor IV), electro-mechanic docking at the musculature and the transmission of impulses within the nervous system. Furthermore calcium is able to stabilize cell membranes.

Causes of calcium deficiency may be:

- lack of vitamin D
- diarrhoea
- laxative abuse
- long-term glucocorticoid therapy respectively
- Cushing syndrome
- therapy with loop diuretics (i.e. Furosemid) or
- longer intake of antacids, doxycycline or magnesium preparations

Possible symptoms of calcium deficiency are:

- osteoporosis
- osteomalacia
- tiredness
- allergies
- cardiac arrhythmias
- circulatory disorders

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- tetany

Iron

The iron level is reduced.

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
- 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

Zinc

The zinc level is within sub-optimal range.

The micronutrient zinc is required as co-factor for more than 200 different enzymes – i.e.:

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

The individual zinc salts (i.e. citrate, sulphate, gluconate, aspartate etc.) are resorbed individually and in different ways. Based on our experience we are not able to state which zinc salt is the most favourable for the respective patient. If a zinc therapy is not successful, it is always reasonable to try switching to another zinc salt.

Reduced zinc levels may be caused by insufficient intake with food. Aside from that, however, malabsorption due to inflammatory gastro-intestinal diseases or medicinal influences is possible (iron, copper, oestrogen, tetracycline, cortisol etc.).

Possible symptoms of zinc deficiencies are:

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- Susceptibility to infections
- Disordered T-cell maturation
- Eczema
- Loss of hair
- Allergies
- Depressive moods
- Nervousness
- Bad wound healing
- Sugar metabolism disorders

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) or
- gastrointestinal resorption disorders

Possible consequences of manganese deficiency are:

- disordered glucose tolerance
- fat metabolism disorders
- bone and cartilage damages
- osteoporosis
- dermatitis
- spermatogenesis disorders
- clotting disorders
- increased AP

Chromium

In this case the chromium supply is regarded as sub-optimal.

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 and
- parenteral diets

Symptoms of inadequate chromium supply are

- diabetes hard to adjust
- tendency to hypoglycaemia

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- peripheral neuropathy and
- fat metabolism disorders

Selenium

The selenium level is within suboptimal range.

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

In addition selenium is essential for regular function of the thyroid gland. The cause of selenium deficiency is mostly insufficient selenium consumption with food.

Aside from excessive alcohol consumption the following may also be causes of selenium deficiency:

- chronic inflammatory diseases,
- tumours and
- heavy metal intoxication.

Possible consequences of selenium deficiency are:

- Thyroid hypofunction
- Allergies
- Increased oxidative stress
- Cardio-myopathies
- Increased tumour risk
- Methaemoglobinaemia

Boron

The boron level in whole blood is decreased.

Boron (B) is a rare, trivalent metalloid and trace element and is mainly ingested via water and food (e.g. peaches, cucumber, soy, raisins, plums and nuts). Boron plays an important role in bone metabolism and cell protection, in the biosynthesis of steroid hormones, has an anti-inflammatory effect and is essential for the mitochondrial energy metabolism. It is also involved in the immune system and brain metabolism. Boron deficiency often occurs as a result of alcohol abuse or during the intake of chlorine-containing antibiotics and is favoured by chlorinated and/or fluorinated water and increased aluminium pollution. Health consequences are e.g. impairment of cognitive functions and hormonal regulatory mechanisms as well as suppression of the immune system and enzyme activity. Calcium and magnesium excretion increases in case of boron deficiency. Boron is therapeutically used in: skin diseases, hyperthyreosis and epilepsy. Since the range between deficiency and toxicity is quite narrow, the boron value should be closely checked in case of substitution. The simultaneous intake of flavonoids, pectin or phenols favours greater effectiveness by boron complex formation.

General therapy recommendations: Boron 3-9 mg/d, calcium, vitamin C, flavonoids

Phosphorus

Phosphorus is decreased.

Phosphorus is an important mineral and, among other things, is involved in the acid-alkaline 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.

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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

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 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, B12

Tin

Increased tin values have been found.

Metallic tin can be found, amongst others, in amalgam fillings, food cans, various other metal containers and in tin solder. But organic tin compounds are much more problematic because they are very often used in industry. For example they get into the sea via boat coatings and accumulate in marine inhabitants. Furthermore, in PVC, wood preservatives and pesticides organotin compounds are detectable. Therefore, the intake occurs via food, inhalation and skin. Tin compounds lead, amongst other things, to anaemia by disturbing the iron resorption, interfere with the calcium homeostasis and various metabolism pathways of the mitochondria and cause interactions e.g. with zinc, copper and selenium. Acute intoxication manifests itself in irritation of eyes and skin, severe sweating, breathlessness, nausea, vomiting, stomach cramps and headaches. Chronic intoxication leads to depression, liver damages, neurotoxicity and dysfunction of immune system. Some organic tin compounds are evidentially genotoxic.

General therapy recommendations: Vitamin C, zinc, methionine, iron, possibly calcium, magnesium and phosphate, alpha-lipoic acid

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Therapy Recommendation

Oral Therapy

Substance **morning** **noon** **evening** **night**

Calcium	15 mmol			
Chromium	100µg			
Manganese	5 mg			
Selenium		50µg		
Zinc	25 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.*