Micro Trace Minerals Laboratory

environmental & clinical laboratory

Röhrenstrasse 20, 91217 Hersbruck, Germany
P.O.Box 4613; Boulder, CO 80306-4613, USA

MINERAL ANALYSIS — Childs' Hair

		Lab Number		1KH225000	
Doctor/Clinic	Sample Doctor			Test Date	10.10.2019
Patient Name	Sample Patient	Sex	f	Age	2
Clinical Information	Sample Report short profile (P9)			Page	1/6

	Acceptable Range	Test Value		
Essential Trace Elements (ppm = mg/kg = mcg/g)				
Chromium (Cr)	0,020 --- 0,150	0,050		
Cobalt (Co)	< 0,150	0,050		
Copper (Cu)	6,700 --- 37,000	37,220	↑	
Iodine (I)	0,150 --- 3,500	494,090	↑	
Iron (Fe)	7,700 --- 15,000	4,080	↓	
Manganese (Mn)	0,070 --- 0,500	0,330		
Molybdenum (Mo)	0,020 --- 1,000	0,070		
Selenium (Se)	0,400 --- 1,400	0,910		
Vanadium (V)	0,010 --- 0,150	n.n.	↓	
Zinc (Zn)	110,000 --- 227,000	139,610		
Essential Macroelements (ppm = mg/kg = mcg/g)				
Calcium (Ca)	200,000 --- 850,000	4.364,750	↑	
Magnesium (Mg)	20,000 --- 115,000	303,480	↑	
Nonessential Trace Elements (ppm = mg/kg = mcg/g)				
Boron (B)	< 2,000	0,910		
Germanium (Ge)	< 0,500	n.n.		
Lithium (Li)	< 0,200	0,010		
Strontium (Sr)	0,110 --- 4,280	12,950	↑	
Tungsten (W)	< 0,020	n.n.		
Potentially Toxic Elements (ppm = mg/kg = mcg/g)				
Aluminum (Al)	< 8,000	2,270		
Antimony (Sb)	< 0,200	0,020		

n.n. = not detected, < x = below Detection Limit
Quality control: Dipl. Ing. Friedle, Accreditation: DIN EN ISO 17025; Validation: Dr. E. Blaurock-Busch PhD

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	Acceptable Range	Test Value		
Potentially Toxic Elements (ppm = mg/kg = mcg/g)				
Arsenic-total (As)	< 0,200	0,030		
Barium (Ba)	< 2,650	4,110	↑	
Beryllium (Be)	< 0,030	n.n.		
Bismuth (Bi)	< 0,179	0,010		
Cadmium (Cd)	< 0,200	0,010		
Lead (Pb)	< 3,000	1,180		
Mercury (Hg)	< 0,300	0,460	↑	
Nickel (Ni)	< 0,850	0,430		
Palladium (Pd)	< 0,100	< 0,050		
Platinum (Pt)	< 0,070	n.n.		
Silver (Ag)	< 1,000	0,030		
Thallium (Tl)	< 0,010	n.n.		
Tin (Sn)	< 0,930	0,060		
Titanium (Ti)	< 0,650	0,170		
Uranium (U)	< 0,100	0,020		
Zirconium (Zr)	< 1,470	< 0,050		

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This Analysis Determined The Following Mineral Deficiencies And Excesses. Since it is difficult to distinguish treated samples from untreated ones, it is assumed that the spectroanalytical analysis was performed on chemically untreated hair as requested in our laboratory brochure. Chemically treated hair does not provide reliable results and MTM does not assume responsibility for data obtained from treated hair. The information contained in this elemental analysis report is designed as an interpretive adjunct to normally conducted diagnostic procedures. The data and information provided here is based on information related to the health of children. The findings are best viewed in the context of a medical examination and history.

BARIUM (Ba):
Barium intestinal dysfunction supports the uptake of this potentially toxic element. Barium is then distributed in very low concentration in soft tissues. It appears to inhibit the calcium absorption and has properties that are similar to lead and cadmium. Barium X-ray techniques can increase tissue levels.
OTHER SOURCES: Drinking water. The EPA allows a maximum level of 1 PPM.
THERAPEUTIC CONSIDERATION: Digestive support to reduce intestinal uptake. Zinc and antioxidants, including selenium are recommeded to normalize barium levels.

CALCIUM (Ca):
High tissue levels of chemically untreated hair reflect malabsorption problems and a masked deficiency, which is caused by calcium being drawn from bones and redistributed into other tissues such as hair. Thus, high hair levels reflect bone withdrawal and osteoporotic tendency. Calcium deficiency symptoms such as unhealthy hair, nail and teeth, muscle cramping at night, insomnia, menstrual problems, nervousness and irritability may be present. When such deficiency symptoms are present, moderate calcium supplementation is recommended in combination with a low fat diet and increased activity level. To further support the calcium absorption and to normalize tissue levels, digestive aids and an increased intake of lecithin are recommended.

COPPER (Cu):
Brain and liver are the main storage sites, while the liver is the main organ for excretion. High hair levels of copper suggest elevated liver storage, and the body's inability to complex copper with amino acids such as histidine, threonine and glutamine. This insufficient complexing prevents the transport of copper between the liver and various peripheral tissues. High hair copper levels have been linked to headache, dizziness, depression and mood disorders, migraines, an increased sensitivity to pain, collagen disease, leukemia’s and other malignancies. Symptoms include nausea, diarrhea, vomiting, and discoloration of skin. High copper levels are often accompanied by zinc deficiency. High copper levels increase the toxic effect of selenium and suppress iron absorption.
SOURCES: Shellfish, nuts, organ meats, eggs, cocoa, chocolate, Brewer's yeast and copper-rich drinking water.
THERAPEUTIC CONSIDERATION: To normalize levels, evaluate iron, manganese, zinc and molybdenum levels. These trace elements are natural antagonists of copper, and deficiency in one of those elements may cause increased absorption of the others. Vitamin C increases the copper excretion, especially when used with amino acids and vitamin B6. In cases of chronic copper intoxication, chelation may be recommended.

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IRON (Fe):
Iron is essential for the oxygen transport and utilization. Iron is regulated in the body primarily by absorption rather than by excretion. The most common sign of deficiency is anemia. Symptoms include pallor and extreme fatigue, dizziness, decreased immune function, shortness of breath and poor appetite. Children with iron deficiency show signs of hyperactivity, decreased attention span and in severe cases a reduced IQ. Behavioral changes manifest prior to a diagnosis of iron deficiency (based on blood tests) and disappear with iron administration. Unusual cravings are common in iron deficiency. An appetite for ice, clay, starch and other nonfood items has been associated with iron deficiency, a condition that has been named "pica" and which responds more rapidly to iron therapy than do changes in red blood cells. Less than 10 percent of dietary iron is absorbed, and the absorption rate increases when blood iron levels are low. Children have a better rate of absorption than adults, but this absorption depends on an adequate stomach acid supply. Adding ascorbic acid can enhance iron absorption, while antacids (which reduce stomach acidity) counteract the effects of ascorbic acid and predispose the user to iron-deficiency anemia. Sulfur-containing amino acids such as methionine also enhance iron absorption. Antibiotics, phosphates, carbonates (such as calcium carbonate) and phytates inhibit iron absorption. Aspirin plays a secondary role in iron loss because of blood lost through low-grade gastrointestinal bleeding. Other predisposing factors to iron deficiency may be excessive intake of copper, manganese, zinc, oxalates, colas and coffee, or heavy metal exposure. Excessive blood loss can cause iron deficiency.
IRON-RICH FOODS ARE: Liver, beef and other meats, dried fruits, lima beans, ham, legumes, dark green leafy vegetables, sardines, prune juice and oysters.
THERAPEUTIC CONSIDERATION: Check lead, copper and manganese levels. Check transferrin levels. Prior to iron supplementation, increase intake of B-complex to aid absorption.

MERCURY (Hg):
Circulating metals in blood ‘feed’ the hair root. Therefore, hair reflects long-term or chronic exposure. Early symptoms of mercury overexposure include insomnia, dizziness, fatigue, drowsiness, weakness, depression, tremors loss of appetite, loss of memory, nervousness, headache, dermatitis, numbness, and tingling of lips and feet, emotional instability and kidney damage.
SYMTOMS OF ACUTE TOXICITY: Loss of teeth, extreme tremor, mental and emotional disorders, kidney failure.
SOURCES: Overexposure may stem from paints, explosives, electrical apparatus, batteries, mercurial diuretics, fungicides, fluorescent lamps, cosmetics, hair dyes, amalgams in dentistry, contaminated seafood, and petroleum products. Vaccines containing thimerosal are another source of exposure. Improper disposal of broken mercury thermometers and other apparatuses that use mercury including button cells and tube lights may also result in mercury exposure.
THERAPEUTIC RECOMMENDATION: Increased oral intake of cysteine and antioxidant intake, especially selenium and vitamin E can support mercury detoxification. Chelating agents such as DMPS or DMSA effectively bind mercury, resulting in an increased urinary excretion, a sign of the detoxification process.

IODINE (I):
Iodine is a component of thyroid hormone, and ultimately the regulation of cellular oxidation. Of the 20 to 50mg of iodine present in the body, 50 percent is found in muscles, 20 percent in the thyroid gland, 10 percent in the skin and 7 percent in the skeletal structure. The remaining 13 percent is found in other endocrine glands such as the ovaries and the central nervous system. One quarter of the iodine in the thyroid gland is found in the thyroid hormone thyroxine (T4) and triiodothyronine (T3). The remaining three-quarters is in the precursor of thyroxine, and in small amounts as the inorganic form. Iodine can be absorbed from the skin surface or from the intestinal tract. In the intestinal tract dietary iodine is converted to iodide and absorption is quick and complete. The excretion is through the kidneys, with minor amounts lost in sweat, tears, saliva, and bile. High hair levels suggest an abundance of iodine in tissues, and a reduction of dietary intake of fish, kelp and other iodine sources is the recommended treatment option.

MAGNESIUM (Mg):
Magnesium is an essential element with both electrolyte and enzyme-activator functions. It is important for energy function and supports the carbohydrate, fat and protein metabolism. High hair tissue levels reflect early bone withdrawal and maldistribution into tissue such as hair. In most cases, high hair levels are signs of a masked deficiency and can be confirmed with deficiency symptoms such as weakness, confusion, personality changes, muscle tremor and spastic tendencies during mild exercise, bizarre muscle movements, especially in the face, swollen gums, skin lesions, lack of coordination and digestive disorders. A magnesium-deficient diet produces hyperkinetic behavior and increases convulsion tendencies, especially in combination with an inadequate B-Vitamin-intake.
RICH FOOD SOURCES OF MAGNESIUM ARE: All fruit and dark green vegetables, nuts, legumes, wholegrain cereals and breads.
THERAPEUTIC CONSIDERATION: B-Vitamins aid magnesium absorption.

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STRONTIUM (Sr):
Strontium possesses physiological and chemical properties similar to calcium. Strontium is poorly absorbed by humans, and the intestinal uptake lies between 5-25%. Of that, about 99% is found in bone and teeth. People living in areas where high levels are found in the water supply, show higher tissue levels. The daily intake varies considerably from 1 mg/day to 4.7 mg/day, according to geography. Strontium can interfere with the calcium metabolism, leading to bone disorders, incl. rickets.
THERAPEUTIC CONSIDERATION: Strontium may compete with the calcium absorption and storage in bone and teeth and when high hair strontium levels are followed by high hair calcium level, the need for an increased calcium supply is indicated. Algae and fibrous cellulose reduce strontium and calcium utilization.

VANADIUM (V):
The biological function of this trace element has not been substantiated and deficiency symptoms have not been established; however there is evidence that this trace element influences the glucose metabolism, the sodium/potassium transport and the adrenal catecholamine metabolism. Vanadium appears to catalyze the oxidation of catecholamine's and inhibit cholesterol synthesis and lower phospholipid levels. It may have an anti-diabetic, weight-reducing function and anti-caries effects.
SOURCE: Fiber-rich foods, dill seeds, parsley and black pepper. Vanadium is highly concentrated in vegetable oils.
THERAPEUTIC CONSIDERATION: High fiber diet, use of vegetable oil instead of animal fats.

The following nutritional program is suitable for children 2 to 12 years of age. For a child under 2 years of age the following recommended dosage have to be adjusted, depending on the child's health, weight and condition. The outlined nutritional suppport program is recommended for 3-4 months, after which a repeat analysis is recommended. A follow-up test would evaluate and determine this child's ability to digest and absorb nutrients. This program has should be supervised by a licensed health care provider. If any questions or problems arise, consult your doctor.

Barium (Ba)

To reduce the barium uptake, support digestive function. Increase the intake of fiber-rich foods and probiotica such as Lactobazillus acidophilus. Increase intake of antioxidants such as vitamin C and bioflavonoids.

Calcium (Ca)

To improve calcium utilization, reduce consumption of dairy products. Avoid fatty foods and increase intake of fiber. Support digestive function. Physical activity greatly aids calcium utilization. Check magnesium and vitamin D intake as they improve calcium utilization.

Copper (Cu)

To normalize copper levels, support liver function and increase intake of B-vitamins, lecithin and antioxidants. Avoid chocolate, meat, and other copper-rich foods. Drinking water testing is recommended, especially if drinking water flows in copper pipes.

Iodine (I)

To reduce iodine exposure, limit intake of fish, algae products and iodine-rich salt.

Iron (Fe)

Check serum iron and serum ferritin levels before supplementing iron. The minimum daily iron requirements for infants 0-6month are 0.2mg/day, for those 7-12month are 7.0-11.0mg/day; for children 1-3year olds 4.0-9.0mg; for 4-8year olds 4.0-10.0mg, and 9-13years 8.0-11.0mg/day. The bioavailability of iron in formula is less than that in breast milk. Iron in vegetarian foods has a lower bioavailability than iron in animal food.

Magnesium (Mg)

High hair magnesium levels may indicate a masked deficiency and an increased need for magnesium. Check for magnesium deficiency symptoms. The minimum daily requirements are: 50mg for children up to 6months; 70mg for 6-12months of age; 150mg for children 1-3years of age; 200mg for age 4-6years; 250mg for age 7-10years and 350mg for youngsters 11-14years of age.

Mercury (Hg)

Mercury increases the need for sulfur and sulfur-containing amino acids such as methionine, selenium and vitamin E. Ask your physician about detoxification treatments.

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Strontium (Sr)

Water and soil can be a source of strontium exposure, depending on the area's geology. Strontium and calcium are handled similarly by the human body and when the dietary intake of strontium is high, strontium begins to replace calcium in developing bone. Hence calcium deficiency increases strontium absorption. Check calcium status and vitamin D level. An increased intake of vitamin D3 and calcium, vegetable fiber, and seaweed can normalize strontium levels.

Vanadium (V)

There is no known daily requirement for vanadium. Good vanadium sources are black pepper, dill seed, peanut butter, codfish, scallops, egg yolk, chicken breast, mushrooms, olives and vegetable oils.

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