Micro Trace Minerals Laboratory

environmental & clinical laboratory

Röhrenstrasse 20, 91217 Hersbruck, Germany
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MINERAL ANALYSIS — Childs' Hair

		Lab Number		1KH120000	
Doctor	Dr Well			Test Date	1/31/2012
Patient Name	Mark M	Sex	m	Age	3
Clinical Information	Autistic since age 1 1/2			Page	1/6

	Acceptable Range	Test Value	
Essential Macroelements (ppm = mg/kg = mcg/g)			
Calcium	200.00 --- 850.00	585.97	
Magnesium	20.00 --- 115.00	14.50	↓
Essential Trace Elements (ppm = mg/kg = mcg/g)			
Chromium	0.02 --- 0.15	0.20	↑
Cobalt	< 0.15	0.02	
Copper	6.70 --- 37.00	22.01	
Iodine	0.15 --- 3.50	1.15	
Iron	7.70 --- 15.00	11.57	
Manganese	0.07 --- 0.50	0.19	
Molybdenum	0.02 --- 1.00	0.10	
Selenium	0.40 --- 1.40	1.45	↑
Vanadium	0.01 --- 0.15	0.07	
Zinc	110.00 --- 227.00	109.86	↓
Nonessential Trace Elements (ppm = mg/kg)			
Boron	< 2.00	1.08	
Germanium	< 0.50	0.03	
Lithium	< 0.20	0.01	
Strontium	0.11 --- 4.28	1.15	
Tungsten	< 0.02	0.01	
Potentially Toxic Elements (ppm = mg/kg = mcg/g)			
Aluminum	< 8.00	20.10	↑
Antimony	< 0.20	0.27	↑

n.n. = not detected
These 95percentile Reference Ranges listed above are representative for a healthy population. All elements are tested quantitatively.
Accreditation: DIN EN ISO 17025; Quality control: Dipl. Ing. Friedle, Ing. J. Merz, Dr. Rauland; Validation: Dr. E.Blaurock-Busch PhD, Laboratory physician: Dr. med. A. Schönberger

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	Acceptable Range	Test Value		
Potentially Toxic Elements (ppm = mg/kg = mcg/g)				
Arsenic-total	< 0.20	0.10		
Barium	< 2.65	0.51		
Beryllium	< 0.03	0.00		
Bismuth	< 0.18	0.03		
Cadmium	< 0.20	0.14		
Lead	< 3.00	7.64	↑	
Mercury	< 0.30	2.29	↑	
Nickel	< 0.85	0.15		
Palladium	< 0.02	0.02	↑	
Platinum	< 0.07	0.00		
Silver	< 1.00	0.34		
Thallium	< 0.01	0.00		
Tin	< 0.93	1.31	↑	
Titanium	< 0.65	0.31		
Uranium 238	< 0.10	0.02		
Zirconium	< 1.47	0.23		

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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.

ALUMINIUM (Al) is commonly ingested with food, medicine and water.
COMMON SOURCES: soft drinks, medications, and certain treated waters. Al is also used in certain covering called Waraq which is another source of silver in India as well as Ayurvedic medicines. Aluminum cooking vessels may also be a cause of excessive Al- intake. For decades, aluminum was considered virtually non-absorbable and was thus freely used in a variety of food additives and over-the-counter drugs such as antacids. New research suggests that Al can cause neurological changes as seen in Alzheimer's and Parkinson's disease, and dialysis dementia. Al can bind to DNA, resulting in abnormal neurofibrillary tangles in the brain. Al inhibits the enzyme, hexokinase. It is absorbed in the intestine and excreted via the kidney. Al can be deposited in bones, particularly in the presence of calcium deficiency.
TOXICITY SYMPTOMS include muscular coordination problems, colic and gastric irritation.
THERAPEUTIC CONSIDERATION: Increased blood levels indicate increased exposure and uptake. To decrease uptake and increase elimination, support digestive and kidney function and check calcium balance. Check hair tissue levels to confirm or rule out longterm exposure. Chelation treatments support the binding and elimination of Aluminum. Comparing pre and post urine levels is a direct reflection on the chelaing agents binding capacity and the body's ability to detoxify.

CHROMIUM (Cr) overexposure may be caused by breathing contaminated industrial air or by contact exposure to chromate dust or other forms of chromium pollution. This environmental (hexavalent) form of chromium is known to result in inflammation of the skin and nasal passages, and lung cancer. Children living near chromium-utilizing industries are prone to dermatitis. An excess intake of nutritional chromium supplements rarely results in high tissue levels, but may be considered as a possible cause. Whole grain, brewer's yeast, molasses, wheat germ and mushrooms are high in chromium. THERAPEUTIC CONSIDERATION: Removal of person from exposure location.

MERCURY (Hg): Circulating metals in blood ‘feed’ the hair root. Therefore, hair reflects longterm 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. Symptoms 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 diurectics, fungicides, fluorescent lamps, cosmetics, hair dyes, amalgams in dentistry, contaminated seafood, and petroleum products. Vaccines containing thiomersal 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, esp selenium and vitamin E can support mercury detoxification. Chelating agents such as DMPS or DMSA effectively bind mercury, resulting in an increased urinary excretion.

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MAGNESIUM (Mg) is an essential element with both electrolyte and enzyme-activator functions. It is a predominately intracellular cation, needed for cell function. 1% of body magnesium is found in blood, 60% is stored in bone, and the remainder is equally divided between muscle and other soft tisse. The absorption and excretion of magnesium is regulated by the kidneys and parathyroid hormones. n Magnesium prevents tissue breakdown and cell distraction. It is needed for energy production, for the protein and sugar synthesis and for removing excess ammonia from the body. It is necessary for muscle relaxation, neuromuscular transmission and activity, and plays a vital role in the prevention of tooth decay by binding calcium to tooth enamel. Low hair issue levels have been linked to gastrointestinal disorders, malnutrition, alopecia, swollen gums, circulatory problems, skin lesions, sugar intolerance and hyperactivity in children. Only 30 percent of the dietary magnesium is absorbed, the remainder being excreted with the feces. Absorption is dependent on intestinal transit time and the rate of water absorption. Magnesium absorption is inhibited by fat, phosphate and lactose. Phytate and oxalates bind with magnesium to form insoluble compounds. DEFICIENCY SYMPTOMS: nervous disorders (tics, tremors, muscle spasms), disorientation, cardiac arrhythmia, fast pulse, pancreatitis, nausea, vomiting, convulsions and seizures (esp. in combination with Vit. B6 deficiency) GOOD FOOD SOURCES: all plant foods, particularly nuts, legumes, wholegrain cereals (baked and cooked) and breads, soybeans and seafoods. THERAPEUTIC CONSIDERATION: Adequate magnesium alleviates behavioral problems, prevents circulatory problems, headaches, insomnia, excessive perspiration, and sleeping problems. Studies indicate that an adequate magnesium supplementationreduced overall illness in tested individuals.

LEAD (Pb): Environmental exposure is a common cause of exposure. High hair levels reflect a high body burden. Lead reduces the body's ability to utilize calcium, magnesium, zinc, iron and other important nutrients. This heavy metal greatly affects health. Lead is deposited in bone and bone marrow, and is a known cause of severe anemias. Lead also affects the central nervous system. Children are easily affected by lead exposure. EARLY TOXICITY SYMPTOMS include abdominal pain, anorexia, anxiety, constipation, fatigue, headaches, impaired coordination, indigestion, irritability, and muscle pains. In more severe cases neurological disorders incl autism, tremors, learning disabilities, hyperactivity and violent behavior are seen. SOURCES: leaded gasoline, canned goods, lead paint, newsprint, tobacco smoke, air pollution, and contaminated water. THERAPEUTIC CONSIDERATION: An increased intake of sulfur-bearing amino acids, Vitamin C and other antioxidants is needed. In acute cases of exposure in children, chelation treatments using the chelating agent DMSA has been recommended by the American Food and Drug Administration (FDA). Check with your physician.

ANTIMONY (Sb) has no known function in living organisms and is not highly toxic. It is found in hair tissue and other organs, with the highest concentration in lymph nodes, lungs, skin and adrenals. Environmental exposure and illness affect the antimony concentration of some tissue. Food stored in enamel vessels and cans may contain appreciable antimony concentration. New research indicates that PET (Polyethylenterephthalat) bottles contain appreciable amounts of Sb, and the antimon concentration of mineral water stored in such bottles has been found to increase over time i.e. mineral water takes up Sb from PET. Trivalent antimony is more toxic than the pentavalent form; however there is no evidence that this element is carcinogenic. THERAPEUTIC CONSIDERATION: increase vitamin C and B-complex intake.

SELENIUM (Se): This trace element closely resembles sulfur in its physical and chemical properties. It is found in the highest concentration in the kidney, heart, spleen and liver. Once absorbed, however, selenium is deposited in all tissues except fat. Selenium functions either alone, or as part of enzyme systems. In humans, toxicity is rare, but excessive intake results in liver and neuromuscular disorders. Children raised in selenium-rich areas show a higher incidence of decayed, missing and filled teeth. Long-term exposure or excess supplementation can cause toxicity symptoms including hair loss, arthritis, brittle nails, prevailing garlic breath and body odor, digestive disorders, irritability, kidney impairment, metallic taste in mouth and yellowish skin. THERAPEUTIC CONSIDERATION: check if the hair has been frequently washed with selenium-containing shampoos. While our laboratory carefully washes all hair samples and thus frees the hair from external contaminants, brittle hair may absorb selenium and other elements into the hair shaft. In such a case, the selenium levels are falsely elevated and do NOT reflect other body tissue levels. Also note that sulfates and sulfur-containing amino acids such as methionine aid to detoxify excess selenium. A diet high in quality proteins may provide protection from selenium toxicity.

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TIN (Sn) is poorly absorbed and retained by humans and is excreted mainly in the feces. Once tin is absorbed, both the bile and urine are routes of excretion and the level of accumulation seems related to the intake. Large amounts of tin can accumulate in foods that are stored or conserved in tin cans, and the amount of tin finding its way into food depends on pH, storage time and temperature, nitrate content of the food and the thickness and quality of the lacquered layer protecting the metal. A can's change to a grey-blackish color is a sign that tin and other metals are being "freed". Another common source of exposure is toothpaste containing stannous fluoride (tin fluoride). Toxic organic compounds are used to stabilize plastics, and are found in disinfectants and fungal medicines. Tin has a low toxicity, but tin salts are gastric irritants causing nausea, vomiting, and diarrhea. High tin levels disturb the metabolism of several minerals, including calcium and zinc. Tin is a potent inducer of heme oxygenase and thus affects heme-dependent functions. TOXICITY SYMPTOMS: vomiting, diarrhea, abdominal cramps, loss of appetite, tightness of chest, metallic taste in mouth, dry throat. Excessive inhalation of tin oxide can cause Stannosis (pneumoconiosis). THERAPEUTIC CONSIDERATION: avoid toothpaste, containing stannous fluoride. Check calcium and zinc levels. Amalgam fillings may be a source of tin exposure.

ZINC (Zn) is distributed in all tissues, with substantial concentrations in the eye, particularly the retina, iris and choroid), kidney, liver, brain, muscle and male reproductive organs. Thus, young developing males have a high need for zinc. This essential trace element is a cofactor for many metalloenzymes, incl. those involving RNA and DNA synthesis. It is necessary for growth, healthy cell division and insulin production. Growing children, cancer and burn patients are at high risk for zinc deficiency, causing fatigue, poor growth, menstrual problem and sexual maturity problems. Deficiency causes are malnutrition and malabsorption. Skin problems, diarrhea, anorexia, hair loss, growth retardation, extreme irritability and increased susceptibility to infection are known deficiency symptoms. In an acute zinc deficiency, taste and small acuity is lost, and wound healing is slow. Thus zinc deficiency is a common problem among children suffering from dermatitis and other skin problems. Zinc acts as a binder to some amino acids, including cysteine, which is the amino acid needed for healthy hair growth. It also in needed for insulin and protein synthesis and zinc deficient children are prone to sugar intolerance, protein digestive problems and food intolerance. Zinc is vital to maintain normal vitamin A levels, and for some enzymatic reactions necessary for normal skin oil gland function. The zinc absorption occurs mainly in the small intestine, and Vitamin B6 is needed for utilization. Strict vegetarians and children on a convenience food diet that includes a high intake of refined carbohydrates, sugars and fat are prone to depressed zinc levels. If a zinc deficiency occurs during a period of rapid growth, the clinical manifestations are most severe. The minimum dialy requirement is 3-10 mg/day, depending on age and sex. In severe zinc deficiency states, a much higher intake is warranted with proper supervision. SOURCE: yeast, meat, fish esp. herring, legumes, and egg yolks. The zinc in whole grains has a low bio-availability. Phytates block zinc absorption and a high intake of uncooked grains or unleavened bread can cause zinc deficiency. Thus, a diet high in cereal and low in animal protein has produced zinc deficiency. The zinc in infant formula isnot absorbed as well as the zinc in breast milk, which contains a zinc-binding protein that increases intestinal absorption. Thus, formula-fed children are subject to zinc deficiency at an early age and if untreated will persist and increase during growing years. THERAPEUTIC CONSIDERATION: Geophagia and intestinal parasites also contribute to poor zinc absorption and a high exposure to toxic metals reduces the zinc absorption and increases the need for zinc and Vit. B6 supplementation. A high iron or molybdenum intake also interferes with the zinc utilization.

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.

Al

To reduce and prevent the aluminum uptake, increase fiber intake and support intestinal function. Lactobazillus acidophilus such Flora Norm improves the intestinal pH and flora, which in turn reduces the aluminum uptake. For children 5 to 11years of age, take 1-2 capsules Flora Norm about 30 minutes before meals, 2-3x daily, depending on age and constitution. For children under the age of 4, open one capsule and add capsule content to food such as joghurt, oatmeal, applesauce etc., 1-2x daily.

Cr

Chromium-rich foods are rarely the cause of high chromium exposure: however, temporarily avoid yeast products and cooking in chromium cookware. The most common cause of high chromium in children is industrial exposure.

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Hg

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

Mg

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. Magnesium-rich foods are nuts, legumes, wholegrain cereals and bread, soybeans and seafoods.

Pb

High lead levels increase the need for zinc and vitamin C. Water testing is recommended. Smoking must be avoided. The American Food and Drug Administration recommends DMSA chelation for lead intoxicated children

Se

To reduce selenium levels, increase intake of sulfur-rich foods such as eggs and other proteins, and vitamin B6.

Sn

To reduce tin levels, avoid canned foods and toothpastes, containing stannous fluoride. Increase Riboflavin intake.

Zn

Healthy children require zinc for adequate growth and immune functions. The minimum daily requirement are: 3mg for infants up to 6 months of age; 5mg for infants 6-12mo; 10mg for children 1-3years of age and 15mg for young people over 11years of age. Nearly 6mg of zinc lost each day, and certain children experience even greater losses. Vitamin B6 aids the absorption ability and ADS, hyperactive and food intolerant people require more of this vitamin. The daily zinc requirement rises in the presence of infection and skin problems, esp wounds and after surgery. Breast milk contains a zinc-binding protein that increases absorption in the infant's intestinal tract; thus breastfed infants are less at risk to develop zinc deficiencies. Product suggestion: 1 tablet of VitMin zinc chelate provides 10mg of zinc (from 74mg of zinc gluconate).

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