HAIR ELEMENTS

DOCTOR'S DATA INC.

LAB#: H100719-2382-1
PATIENT: Frank

SEX: Male
AGE: 66

CLIENT#: 26339
DOCTOR:
Cellphysics.Org
6800 Fort Smallwood Rd
Baltimore, MD 21226 USA

POTENTIALLY TOXIC ELEMENTS

TOXIC ELEMENTS	RESULT µg/g	REFERENCE RANGE
Aluminum	0.7	< 7.0
Antimony	< 0.01	< 0.066
Arsenic	0.079	< 0.080
Barium	0.12	< 1.0
Beryllium	< 0.01	< 0.020
Bismuth	< 0.002	< 2.0
Cadmium	0.022	< 0.065
Lead	0.11	< 0.80
Mercury	1.5	< 0.80
Platinum	< 0.003	< 0.005
Thallium	< 0.001	< 0.002
Thorium	< 0.001	< 0.002
Uranium	0.001	< 0.060
Nickel	0.01	< 0.20
Silver	0.10	< 0.08
Tin	0.04	< 0.30
Titanium	0.38	< 0.60
Total Toxic Representation		

PERCENTILE: 68th, 95th

ESSENTIAL AND OTHER ELEMENTS

ELEMENTS	RESULT µg/g	REFERENCE RANGE
Calcium	191	200- 750
Magnesium	27	25- 75
Sodium	130	20- 180
Potassium	23	9- 80
Copper	12	11- 30
Zinc	190	130- 200
Manganese	0.12	0.08- 0.50
Chromium	0.37	0.40- 0.70
Vanadium	0.029	0.018- 0.065
Molybdenum	0.022	0.025- 0.060
Boron	1.4	0.40- 3.0
Iodine	31	0.25- 1.8
Lithium	< 0.004	0.007- 0.020
Phosphorus	210	150- 220
Selenium	1.2	0.70- 1.2
Strontium	0.36	0.30- 3.5
Sulfur	49500	44000- 50000
Cobalt	0.004	0.004- 0.020
Iron	9.8	7.0- 16
Germanium	0.031	0.030- 0.040
Rubidium	0.041	0.011- 0.12
Zirconium	0.015	0.020- 0.44

PERCENTILE: 2.5th, 16th, 50th, 84th, 97.5th

SPECIMEN DATA

COMMENTS:

Date Collected: 7/10/2010
Date Received: 7/19/2010
Date Completed: 7/20/2010
Client Reference:
Methodology: ICP-MS

Sample Size: 0.198 g
Sample Type: Head
Hair Color: Brown
Treatment:
Shampoo: Sappaohill Bar So

V010.08

RATIOS

ELEMENTS	RATIOS	EXPECTED RANGE
Ca/Mg	7.07	4- 30
Ca/P	0.91	0.8- 8
Na/K	5.65	0.5- 10
Zn/Cu	15.8	4- 20
Zn/Cd	> 999	> 800

HAIR ELEMENTS REPORT
INTRODUCTION

Hair is an excretory tissue for essential, nonessential and potentially toxic elements. In general, the amount of an element that is irreversibly incorporated into growing hair is proportional to the level of the element in other body tissues. Therefore, hair elements analysis provides an indirect screening test for physiological excess, deficiency or maldistribution of elements in the body. Clinical research indicates that hair levels of specific elements, particularly potentially toxic elements such as cadmium, mercury, lead and arsenic, are highly correlated with pathological disorders. For such elements, levels in hair may be more indicative of body stores than the levels in blood and urine.

All screening tests have limitations that must be taken into consideration. The correlation between hair element levels and physiological disorders is determined by numerous factors. Individual variability and compensatory mechanisms are major factors that affect the relationship between the distribution of elements in hair and symptoms and pathological conditions. It is also very important to keep in mind that scalp hair is vulnerable to external contamination of elements by exposure to hair treatments and products. Likewise, some hair treatments (e.g. permanent solutions, dyes, and bleach) can strip hair of endogenously acquired elements and result in false low values. Careful consideration of the limitations must be made in the interpretation of results of hair analysis. The data provided should be considered in conjunction with symptomology, diet analysis, occupation and lifestyle, physical examination and the results of other analytical laboratory tests.

Caution: The contents of this report are not intended to be diagnostic and the physician using this information is cautioned against treatment based solely on the results of this screening test. For example, copper supplementation based upon a result of low hair copper is contraindicated in patients afflicted with Wilson's Disease.

Mercury High

Hair mercury (Hg) is an excellent indiator of exposure to Hg, particularly organic Hg derived from fish. Mercury is toxic to humans and animals. Individuals vary greatly in sensitivity and tolerance to Hg burden.

Hg can suppress biological selenium function and may cause or contribute to immune dysregulation in sensitive individuals. Hallmark symptoms of excess Hg include: loss of appetite, decreased senses of touch, hearing, and vision, fatigue, depression, emotional instability, peripheral numbness and tremors, poor memory and cognitive dysfunction, and neuromuscular disorders. Hair Hg has been reported to correlate with acute myocardial infarction and on average each 1 µg/g of hair Hg was found to correlate with a 9% increase in AMI risk (Circulation 1995; 91:645-655).

Sources of Hg include dental amalgams, fish, water supplies, some hemorrhoidal preparations, skin lightening agents, instruments (thermometers, electrodes, batteries), and combustion of fossil fuels, some fertilizers, and the paper/pulp and gold industries. After dental amalgams are installed or removed a transient (several months) increase in hair Hg is observed. Also, "baseline" hair Hg levels for individuals with dental amalgams are higher (about 1 to 2 µg/g) than are baseline levels for those without (below 1 µg/g).

Confirmatory tests for elevated Hg are measurement of whole blood as an indication of recent/ongoing exposure (does not correlate with whole body accumulation) and measurement of urine Hg before and after administration of a dithiol metal binding agent such as DMSA or DMPS (an indication of total body burden).

Silver High

Hair Silver (Ag) levels have been found to reflect environmental exposure to the element. However, hair is commonly contaminated with Ag from hair treatments such as permanents, dyes, and bleaches.

Ag is not an essential element and is of relatively low toxicity. However, some Ag salts are very toxic.

Sources of Ag include seafood, metal and chemical processing industries, photographic processes, jewelry making (especially soldering), effluents from coal fired power plants and colloidal silver products.

The bacteriostatic properties of Ag have been long recognized and Ag has been used extensively for medicinal purposes; particularly in the treatment of burns. There is much controversy over the long term safety of consumption of colloidal silver. Very high intake of colloidal silver has been reported to give rise to tumors in the liver and spleen of animals (Metals in Clinical and Analytical Chemistry, eds. Seiler, Segel and Segel, 1994). However, these data may not have relevance to the effects of chronic, low level consumption by humans.

Calcium Low

Hair Calcium (Ca) levels have been correlated with nutritional intake, several disease syndromes, and metabolic disorders. Interpretation of low hair Ca levels is difficult and other variables need to be considered.

Ca is the most abundant element in the body. Although most Ca is contained in the skeletal system, Ca is actively involved in muscle contraction, the nervous system, hormone secretion, and immunological responses.

Causes of Ca deficiency include but are not limited to inadequate dietary Ca, protein or vitamin D, excess dietary phosphorus and malabsorption. Malabsorption is likely if other essential elements such as magnesium, cobalt, manganese, and chromium are also at low levels in hair. Other factors associated with poor Ca status include physical inactivity, chronic stress, hormonal imbalance, aluminum containing antacids, chronic use of diuretics or laxatives, high alcohol intake, and exposure to toxic elements (e.g. lead, cadmium).

Symptoms of Ca deficiency include: muscle cramps or tetany, myalgia, and skeletal pain. Chronic Ca deficiency (or negative balance) results in osteoporosis.

Hair is vulnerable to external contamination by Ca as a result of hair treatments (permanent solutions, dyes, bleach). Other means to assess Ca status include: dietary assessment, whole blood elements analysis, and measurement of bone density, serum vitamin D-3, and parathyroid hormone.

Copper Normal

Hair Copper (Cu) levels are usually indicative of body status, except that exogenous contamination may occur giving a false normal (or false high). Common sources of contamination include: permanent solutions, dyes, bleaches, and swimming pools/hot tubs in which Cu compounds have been used as algaecides.

Cu is an essential element that activates specific enzymes. Erythrocyte superoxide dismutase (SOD) is a Cu (and zinc) dependent enzyme; lysyl oxidase which catalyzes crosslinking of collagen is another Cu dependent enzyme. Adrenal catecholamine synthesis is Cu dependent, because the enzyme dopamine beta-hydroxylase, which catalyzes formation of norepinephrine from dopamine, requires Cu.

If hair Cu is in the normal range, this usually means tissue levels are in the normal range. However, under circumstances of contamination, a real Cu deficit could appear as a (false) normal. If symptoms of Cu deficiency are present, a whole blood or red blood cell elements analysis can be performed for confirmation of Cu status.

Chromium Low

Hair Chromium (Cr) is a good indicator of tissue levels and may provide a better indication of status than do urine or blood plasma/serum (Nielsen, F.H. In Modern Nutrition on Health and Disease; 8th Edition, 1994. Ed. Shils, Olson and Shike. Lea and Febiger, Philadelphia). Hair Cr is seldom affected by permanent solutions, dyes and bleaches.

Cr (trivalent) is generally accepted as an essential trace element that is required for maintenance of normal glucose and cholesterol levels; it potentiates insulin function, i.e., as a part of ”glucose tolerance factor”. Deficiency conditions may include hyperglycemia, transient hyper/hypoglycemia, fatigue, accelerated atherosclerogenesis, elevated LDL cholesterol, increased need for insulin and diabetes-like symptoms, and impaired stress responses. Marginal or insufficient Cr is common in the U.S., where average tissue levels are low compared to those found in many other countries. Low hair Cr appears to be associated with increased risk of cardiovascular disease and an atherogenic lipoprotein profile (low HDL, high LDL). Common causes of deficiency are ingestion of highly processed foods, inadequate soil levels of Cr, gastrointestinal dysfunction, and insufficient vitamin B-6. Cr status is also compromised in patients with iron overload/high transferrin saturation because transferrin is a major transport protein for Cr.

Confirmatory tests for Cr adequacy include glucose tolerance and packed red blood cell elements analysis.

Molybdenum Low

Low Molybdenum (Mo) in hair is a possible indication of Mo deficiency. Hair is very rarely contaminated with exogenous Mo.

Mo is an essential trace element that is an activator of specific enzymes such as: xanthine oxidase (catalyzes formation of uric acid), sulfite oxidase (catalyzes oxidation of sulfite to sulfate), and aldehyde dehydrogenase (catalyzes oxidation of aldehydes). Possible effects or symptoms consistent with Mo deficiency are: subnormal uric acid in blood and urine, sensitivity or reactivity

to sulfites, protein intolerance (specifically to sulfur-bearing amino acids), and sensitivity or reactivity to aldehydes.

True Mo deficiency is uncommon but may result from: a poor-quality diet, gastrointestinal dysfunctions, or tungsten exposure. Tungsten (from "TIG" welding) can be a powerful antagonist of Mo retention in the body. Copper overload can also reduce Mo retention.

Because normal blood and blood cell Mo levels are very low (a few parts per billion), blood measurement is not an appropriate tissue for confirmation of subnormal molybdenum.

Confirmatory tests for Mo deficiency include measurement of urine sulfite concentration (increased in Mo deficiency), measurement of blood/urine uric acid level (decreased in Mo deficiency), and measurement of urinary Mo content.

Iodine High

Hair Iodine (I) levels have been noted to vary according to I status levels and dietary intake. I is nutritionally essential for humans and is used in the formation of thyroid hormones. I is bound to the tyrosine residue in thyroglobulin to form triiodothyronine (T-3) and thyroxine (T-4). However, there is no scientific support indicating that high hair I levels, per se, are diagnostic of thyroid function.

External contamination of hair with I from hair treatments is possible. Contamination is often accompanied by elevated aluminum, silver, nickel, and titanium if there is exogenous I contamination from hair preparations.

Conditions that may be associated with excessive I include: hypersensitivity reactions, hypothyroidism, thyroiditis, and iodide goiter. Hypersensitivity reactions can be immunologic or nonimmunologic, but usually include dermatological irritation or contact dermatoses. Other possible hypersensitivity reactions include: angio-edema, burning or soreness of mouth and throat, and nausea/diarrhea. Autonomous thyrotoxicosis (Plummer's disease) and autoimmune thyrotoxicosis (Graves' disease) may occur in I excess if thyroid function is poorly controlled by hypothalamic-pituitary action. If questionable, thyroid function should be assessed by measurement of TSH, T-4, and T-3.

Lithium Low

Lithium (Li) is normally found in hair at very low levels. Hair Li correlates with high dosage of Li carbonate in patients treated for Affective Disorders. However, the clinical significance of low hair Li levels is not certain at this time. Thus, hair Li is measured primarily for research purposes. Anecdotally, clinical feedback to DDI consultants suggests that low level Li supplementation may have some beneficial effects in patients with behavioral/emotional disorders. Li occurs almost universally in water and in the diet; excess Li is rapidly excreted in urine.

Li at low levels may have essential functions in humans. Intracellularly, Li inhibits the conversion of phosphorylated inositol to free inositol. In the nervous system this moderates neuronal excitability. Li also influences monamine neurotransmitter concentrations at the synapse (this function is increased when Li is used therapeutically for mania or bipolar illness).

A confirmatory test for low Li is measurement of Li in blood serum/plasma.

Total Toxic Element Indication

The potentially toxic elements vary considerably with respect to their relative toxicities. The accumulation of more than one of the most toxic elements may have synergistic adverse effects, even if the level of each individual element is not strikingly high. Therefore, we present a total toxic element ”score” which is estimated using a weighted average based upon relative toxicity. For example, the combined presence of lead and mercury will give a higher total score than that of the combination of silver and beryllium.