DOCTOR'S DATA INC

LAB #: H200305-2275-1
PATIENT: Mohammed Hasan Banat
ID: BANAT-M-00002
SEX: Male
DOB: 01/27/1978 AGE: 42

CLIENT #: 31052
DOCTOR: Robert Miller, ND
Tree Of Life Health Ministries
116 Lake St Ste 1
Ephrata, PA 17522 U.S.A.

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	2.3	< 7.0	
Antimony	(Sb)	0.097	< 0.066	
Arsenic	(As)	0.035	< 0.080	
Barium	(Ba)	0.14	< 1.0	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.005	< 2.0	
Cadmium	(Cd)	< 0.009	< 0.065	
Lead	(Pb)	0.14	< 0.80	
Mercury	(Hg)	0.73	< 0.80	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	< 0.001	< 0.002	
Thorium	(Th)	< 0.001	< 0.002	
Uranium	(U)	0.050	< 0.060	
Nickel	(Ni)	0.07	< 0.20	
Silver	(Ag)	0.06	< 0.08	
Tin	(Sn)	0.02	< 0.30	
Titanium	(Ti)	0.41	< 0.60	
Total Toxic Representation				

ESSENTIAL AND OTHER ELEMENTS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Calcium	(Ca)	377	200- 750	
Magnesium	(Mg)	47	25- 75	
Sodium	(Na)	6	20- 180	
Potassium	(K)	< 3	9- 80	
Copper	(Cu)	11	11- 30	
Zinc	(Zn)	240	130- 200	
Manganese	(Mn)	0.06	0.08- 0.50	
Chromium	(Cr)	0.59	0.40- 0.70	
Vanadium	(V)	0.052	0.018- 0.065	
Molybdenum	(Mo)	0.031	0.025- 0.060	
Boron	(B)	0.76	0.40- 3.0	
Iodine	(I)	0.16	0.25- 1.8	
Lithium	(Li)	< 0.004	0.007- 0.020	
Phosphorus	(P)	188	150- 220	
Selenium	(Se)	0.77	0.70- 1.2	
Strontium	(Sr)	0.38	0.30- 3.5	
Sulfur	(S)	50100	44000- 50000	
Cobalt	(Co)	0.004	0.004- 0.020	
Iron	(Fe)	7.3	7.0- 16	
Germanium	(Ge)	0.034	0.030- 0.040	
Rubidium	(Rb)	0.004	0.011- 0.12	
Zirconium	(Zr)	0.071	0.020- 0.44	

SPECIMEN DATA

COMMENTS:

Date Collected: **02/29/2020**
Date Received: **03/05/2020**
Date Reported: **03/06/2020**
Methodology: **ICP/MS**

Sample Size: **0.198 g**
Sample Type: **Head**
Hair Color: **Black**
Treatment:
Shampoo: **Aluminum Free**

RATIOS

ELEMENTS	RATIOS	RANGE
Ca/Mg	8.02	4- 30
Ca/P	2.01	0.8- 8
Na/K	2	0.5- 10
Zn/Cu	21.8	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.

Antimony High

Hair is a preferred tissue for analysis of Antimony (Sb) exposure and body burden. Elevated hair Sb levels have been noted as long as a year after exposure.

Sb is a nonessential element that is chemically similar to but less toxic than arsenic. Food and smoking are the usual sources of Sb. Thus cigarette smoke can externally contaminate hair, as well as contribute to uptake via inhalation. Gunpowder (ammunition) often contains Sb. Firearm enthusiasts often have elevated levels of Sb in hair. Other possible sources are textile industry, metal alloys, and some antihelminthic and antiprotozoic drugs. Sb is also used in the manufacture of paints, glass, ceramics, solder, batteries, bearing metals, semiconductors and fire retardant fabrics.

Like arsenic, Sb has a high affinity for sulfhydryl groups on many enzymes. Sb is conjugated with glutathione and excreted in urine and feces. Therefore, excessive exposure to Sb has the potential to deplete intracellular glutathione pools.

Early signs of Sb excess include: fatigue, muscle weakness, myopathy, nausea, low back pain, headache, and metallic taste. Later symptoms include hemolytic anemia, myoglobinuria, hematuria and renal failure. Transdermal absorption can lead to "antimony spots" which resemble chicken pox. Respiratory tissue irritation may result from inhalation of Sb particles or dust.

A confirmatory test for recent or current exposure is the measurement of Sb in the urine or whole blood. Comparison of pre and post provocation (DMPS, DMSA, Ca-EDTA) urine Sb levels provides an estimate of net retention (body burden) of Sb.

Sodium Low

The level of Sodium (Na) in hair has not been documented to be indicative of dietary adequacy or nutritional status. Na is an essential element with extracellular electrolyte functions, but these functions do not occur in hair. Low hair Na may have no clinical significance or it may be consistent with electrolyte imbalance associated with adrenal insufficiency. In this condition, blood Na would be low, blood potassium would be high, and urinary levels of Na would be expected to be high. Observations at DDI indicate that Na and potassium levels in hair are commonly low in association with emotional stress. The low levels of Na and potassium are frequently concomitant with high levels of calcium and magnesium in hair. This apparent ”emotional stress pattern” requires further investigation.

Appropriate tests for Na status as an electrolyte are measurements of Na in whole blood and urine, and measurements of adrenocortical function.

Potassium Low

The level of Potassium (K) in hair does not reflect nutritional status or dietary intake. However, hair K levels may provide clinically relevant information pertaining to adrenal function and/or electrolyte balance.

K is an electrolyte and a potentiator of enzyme functions in cells, but neither of theses functions takes place in hair. K can be low in the body as the result of gastrointestinal or renal dysfunction, or as a side effect of some diuretics. In adrenocortical hyperactivity, blood levels of K are depressed, while urinary K is increased. Low hair K should be viewed as a screening test. Observations at DDI indicate that hair levels of sodium and K are commonly low in association with emotional stress. The low levels of sodium and K are frequently concomitant with high levels of calcium and magnesium in hair. This apparent ”emotional stress pattern” requires further investigation.

Symptoms of true K deficiency include: muscle weakness, fatigue, and tachycardia. Diabetic acidosis can result in severe K loss.

Confirmatory tests for K deficiency include measurements of packed red blood cell K; whole blood K and the sodium/K ratio; urine K and the sodium/K ratio. An electrocardiogram may show abnormalities when K is low in serum/plasma or whole blood.

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.

Zinc High

A result of high hair Zinc (Zn) may be indicative of low Zn in cells, and functional Zn insufficiency, or excessive Zn supplementation.Zn can be displaced from proteins such as intracellular metallothionein by other metals, particularly cadmium, lead, copper, and mercury (Toxicology of Metals, 1994), resulting in paradoxically elevated hair Zn. Zn may also be high in hair as a result of the use of Zn-containing anti-dandruff shampoo. Rough or dry, flaky skin is a symptom of Zn deficiency, so it is not uncommon for Zn deficient patients to use an anti-dandruff shampoo. A result of high hair Zn warrants further testing to assess Zn status. Confirmatory tests for Zn status are whole blood or packed red blood cell elements analysis.

Zn is an essential element that is required in many very important biological processes. However, Zn can be toxic if exposure is excessive. Although very uncommon, high hair Zn might be indicative of Zn overload which could result from Zn contaminated water (galvanized pipes), welding or gross, chronic over-supplementation (100 mg/day). Other sources of Zn include: manufacture of brass, bronze, white paint, and pesticide production. Symptoms of Zn excess include: gastrointestinal disorders, decreased heme synthesis (copper deficiency), tachycardia, blurred vision, and hypothermia.

Manganese Low

Hair Manganese (Mn) levels correlate well with Mn levels in other body tissues. Hair Mn levels are commonly low, in part due to low dietary Mn intake and the interaction of Mn with phosphates in the gut. Intestinal malabsorption also limits Mn uptake.

Mn is an essential element that is involved in energy metabolism, and bone and cartilage formation. Mn is an activator of many important enzymes including: mitochondrial superoxide dismutase, arginase, and pyruvate carboxylase.

Symptoms associated with Mn deficiency include: fatigue, lack of physical endurance, slow growth of fingernails and hair, impaired metabolism of bone and cartilage, dermatitis, weight loss, and reduced fertility. Increased allergic sensitivities and inflammation are often associated with low Mn. Seizures are occasionally reported to be associated with severe Mn deficiency.

An appropriate laboratory test to confirm Mn deficiency is whole blood elements analysis.

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.