



LAB #: H180119-2520-1
 PATIENT:
 ID:
 SEX: Male
 AGE: 35

CLIENT #: 31417
 DOCTOR:
 Research Nutrition Pty Ltd
 18 / 93 Rivergate PI
 Murarrie, Qld, 4172 AUSTRALIA

Toxic & Essential Elements; Hair

TOXIC METALS				PERCENTILE		
		RESULT µg/g	REFERENCE INTERVAL	68 th	95 th	
Aluminum (Al)		1.1	< 7.0			
Antimony (Sb)		0.011	< 0.066			
Arsenic (As)		0.042	< 0.080			
Barium (Ba)		0.29	< 1.0			
Beryllium (Be)		< 0.01	< 0.020			
Bismuth (Bi)		< 0.002	< 2.0			
Cadmium (Cd)		< 0.009	< 0.065			
Lead (Pb)		0.34	< 0.80			
Mercury (Hg)		0.46	< 0.80			
Platinum (Pt)		< 0.003	< 0.005			
Thallium (Tl)		< 0.001	< 0.002			
Thorium (Th)		< 0.001	< 0.002			
Uranium (U)		0.008	< 0.060			
Nickel (Ni)		0.05	< 0.20			
Silver (Ag)		0.01	< 0.08			
Tin (Sn)		0.05	< 0.30			
Titanium (Ti)		0.15	< 0.60			
Total Toxic Representation						

ESSENTIAL AND OTHER ELEMENTS				PERCENTILE				
		RESULT µg/g	REFERENCE INTERVAL	2.5 th	16 th	50 th	84 th	97.5 th
Calcium (Ca)		326	200– 750					
Magnesium (Mg)		41	25– 75					
Sodium (Na)		29	20– 180					
Potassium (K)		23	9– 80					
Copper (Cu)		38	11– 30					
Zinc (Zn)		190	130– 200					
Manganese (Mn)		0.05	0.08– 0.50					
Chromium (Cr)		0.36	0.40– 0.70					
Vanadium (V)		0.024	0.018– 0.065					
Molybdenum (Mo)		0.027	0.025– 0.060					
Boron (B)		5.1	0.40– 3.0					
Iodine (I)		0.91	0.25– 1.8					
Lithium (Li)		< 0.004	0.007– 0.020					
Phosphorus (P)		151	150– 220					
Selenium (Se)		0.70	0.70– 1.2					
Strontium (Sr)		0.61	0.30– 3.5					
Sulfur (S)		48000	44000– 50000					
Cobalt (Co)		0.002	0.004– 0.020					
Iron (Fe)		4.0	7.0– 16					
Germanium (Ge)		0.034	0.030– 0.040					
Rubidium (Rb)		0.013	0.011– 0.12					
Zirconium (Zr)		< 0.007	0.020– 0.44					

SPECIMEN DATA		RATIOS		
COMMENTS:		ELEMENTS	RATIOS	RANGE
Date Collected: 01/11/2018		Ca/Mg	7.95	4– 30
Date Received: 01/19/2018		Ca/P	2.16	0.8– 8
Date Completed: 01/24/2018		Na/K	1.26	0.5– 10
Methodology: ICP/MS		Zn/Cu	5	4– 20
Sample Size: 0.199 g		Zn/Cd	> 999	> 800
Sample Type: Head				
Hair Color:				
Treatment:				
Shampoo: The Body Shop				

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.

Copper High

The high level of Copper (Cu) in hair may be indicative of excess Cu in the body. However, it is important first to rule out exogenous contamination sources: permanent solutions, dyes, bleaches, swimming pool/hot tub water, and washing hair in acidic water carried through Cu pipes. In the case of contamination from hair preparations, other elements (aluminum, silver, nickel, titanium) are usually also elevated.

Sources of excessive Cu include contaminated food or drinking water, excessive Cu supplementation, and occupational or environmental exposures. Insufficient intake of competitively absorbed elements such as zinc or molybdenum can lead to, or worsen Cu excess.

Medical conditions that may be associated with excess Cu include: biliary obstruction (reduced ability to excrete Cu), liver disease (hepatitis or cirrhosis), and renal dysfunction. Symptoms associated with excess Cu accumulation are muscle and joint pain, depression, irritability, tremor, hemolytic anemia, learning disabilities, and behavioral disorders.

Confirmatory tests for Cu excess are a comparison of Cu in pre vs. post provocation (D-penicillamine, DMPS) urine elements tests and a whole blood elements analysis.

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.

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.

Cobalt Low

One can not determine vitamin B-12 status by use of hair analysis, and the clinical significance of low hair Cobalt (Co) levels is not known. Hair is analyzed for Co primarily for detection of excessive intake of the potentially toxic element.

There is little evidence that Co has an essential function in humans other than as an obligatory constituent of the vitamin B-12 molecule. Humans absorb Co as inorganic Co and as vitamin B-12; the body pools of each fluctuate independently. Humans cannot convert inorganic Co to vitamin B-12.

The dietary content of Co is highly variable, depending upon types of foods eaten, geographical location and type of soil. Vegetarians often have lower Co levels than meat eaters.

Appropriate tests for determination of vitamin B-12 status are the measurement of urine levels of methylmalonic acid (elevated with vitamin B-12 coenzyme deficiency/dysfunction), a quantitative blood assay for vitamin B-12, a urine amino acids analysis (several metabolic steps require vitamin B-12), and diet analysis.

Boron High

Boron (B) is normally found in hair but the correlations among B absorption, and tissue and hair levels of B have yet to be determined. B has a low order of toxicity, but excessive intake induces riboflavinuria. Exogenous contamination of hair with B is possible since B is present in some soaps. B is also present in some cleaners, cements, ceramics, and glass.

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.

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Page: 4
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