Anamol Laboratories

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Hair Mineral Analysis

Client #: **33135** Doctor: **Joel Villeneuve, ND** **Revive Life Clinic** **2249 Carling Ave Ste 320** **Ottawa, ON K2B 7E9 CANADA**	Lab #: **H121227-2066-1** Name: **Ludvig Sunstrom** ID: **SUNSTROM-L-00001** Sex: **Male** Age: **21**	Hair Location: **Head** Sample Size: **0.199 g** Hair Colour: **Brown** Shampoo: **Axe** Treatment:	Date Collected: 12/05/2012 Date In: 12/27/2012 Date Out: 12/29/2012 Methodology: ICP-MS

Toxic Elements	Results (µg/g)	Ref Range	Within Range / Above Range	
Aluminum	2.9	< 7.0		Al
Antimony	0.017	< 0.066		Sb
Arsenic	0.019	< 0.080		As
Barium	0.51	< 1.0		Ba
Beryllium	< 0.01	< 0.020		Be
Bismuth	0.038	< 2.0		Bi
Cadmium	0.016	< 0.065		Cd
Lead	0.13	< 0.80		Pb
Mercury	0.64	< 0.80		Hg
Platinum	< 0.003	< 0.005		Pt
Thallium	< 0.001	< 0.002		Tl
Thorium	< 0.001	< 0.002		Th

Nutritional Elements	Results (µg/g)	Ref Range	Below Range / 50th Percentile / Above Range	
Boron	0.49	0.40- 3.0		B
Calcium	420	200- 750		Ca
Chromium	0.34	0.40- 0.70		Cr
Copper	26	11- 30		Cu
Iron	6.5	7.0- 16		Fe
Magnesium	34	25- 75		Mg
Manganese	0.09	0.08- 0.50		Mn
Molybdenum	0.032	0.025- 0.060		Mo
Phosphorus	153	150- 220		P
Potassium	10	9- 80		K
Rubidium	0.011	0.011- 0.12		Rb
Sulfur	47200	44000- 50000		S
Selenium	0.54	0.70- 1.2		Se
Sodium	33	20- 180		Na
Strontium	1.2	0.30- 3.5		Sr
Zinc	170	130- 200		Zn

* <dl = Less than Detection Limit Comments: v10.08

Potentially Toxic Elements	Results (µg/g)	Ref Range	
Nickel	0.06	< 0.20	Ni
Silver	0.05	< 0.08	Ag
Tin	0.06	< 0.30	Sn
Titanium	0.23	< 0.60	Ti
Uranium	0.028	< 0.060	U

Other Elements	Results (µg/g)	Ref Range	
Cobalt	0.003	0.004- 0.020	Co
Germanium	0.025	0.030- 0.040	Ge
Iodine	2.3	0.25- 1.8	I
Lithium	< 0.004	0.007- 0.020	Li
Vanadium	0.024	0.018- 0.065	V
Zirconium	0.071	0.020- 0.44	Zr

Significant Ratios	Results	Ref Range
Ca:Mg	12.4	4- 30
Fe:Cu	0.25	0.2-1.3
Na:K	3.3	0.5- 10
Zn:Cu	6.54	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.

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.

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.

Selenium Low

Selenium (Se) is normally found in hair at very low levels, and several studies provide evidence that low hair Se is reflective of dietary intake and associated with cardiovascular disorders. Utilization of hair Se levels to assess nutritional status, however, is complicated by the fact that use of Se- or sulfur-containing shampoo markedly increases hair Se (externally) and can give a false high value.

Se is an extremely important essential element due to its antioxidative function as an obligatory component of the enzyme glutathione peroxidase. Se is also protective in its capacity to bind and

"inactivate" mercury, and Se is an essential cofactor in the deiodination of T-4 to active T-3 (thyroid hormone). Some conditions of functional hypothyroidism therefore may be due to Se deficiency (Nature; 349:438-440, 1991); this is of particular concern with mercury exposure. Studies have also indicated significant inverse correlations between Se and heart disease, cancer, and asthma.

Selenium deficiency is common and can result from low dietary intake of Se or vitamin E, and exposure to toxic metals, pesticides/herbicides and chemical solvents.

Symptoms of Se deficiency are similar to that of vitamin E deficiency and include muscle aches, increased inflammatory response, loss of body weight, alopecia, listlessness, skeletal and muscular degeneration, growth stunting, and depressed immune function.

Confirmatory tests for Se deficiency are Se content of packed red blood cells, and activity of glutathione peroxidase in red blood cells.