LAB #: H000000-0000-0
PATIENT: Sample Patient
ID: PATIENT-S-00041
SEX: Female
AGE: 51

CLIENT #: 12345
DOCTOR:
Doctor's Data, Inc.
3755 Illinois Ave.
St. Charles, IL 60174

Toxic Element Exposure Profile; Hair

TOXIC METALS

		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Arsenic	(As)	0.021	< 0.14	
Lead	(Pb)	0.38	< 3.0	
Mercury	(Hg)	0.21	< 3.0	
Cadmium	(Cd)	0.032	< 0.20	
Chromium	(Cr)	0.52	< 0.85	
Beryllium	(Be)	< 0.01	< 0.050	
Cobalt	(Co)	0.010	< 0.15	
Nickel	(Ni)	0.54	< 1.0	
Zinc	(Zn)	170	< 300	
Copper	(Cu)	160	< 70	
Thorium	(Th)	< 0.001	< 0.005	
Thallium	(Tl)	< 0.001	< 0.005	
Barium	(Ba)	1.3	< 8.0	
Cesium	(Cs)	< 0.002	< 0.010	
Manganese	(Mn)	0.19	< 1.5	
Selenium	(Se)	0.70	< 2.1	
Bismuth	(Bi)	0.018	< 5.0	
Vanadium	(V)	0.049	< 0.20	
Silver	(Ag)	0.86	< 1.6	
Antimony	(Sb)	< 0.01	< 0.12	
Palladium	(Pd)	0.011	< 0.015	
Aluminum	(Al)	24	< 19	
Platinum	(Pt)	< 0.003	< 0.010	
Tungsten	(W)	< 0.001	< 0.015	
Tin	(Sn)	0.38	< 1.0	
Uranium	(U)	0.26	< 0.20	
Gold	(Au)	0.082	< 0.50	
Tellurium	(Te)	< 0.05	< 0.050	
Germanium	(Ge)	0.029	< 0.045	
Titanium	(Ti)	0.70	< 2.0	
Gadolinium	(Gd)	< 0.001	< 0.008	

SPECIMEN DATA

Comments: **insufficient sample to recheck results**

Sample Type: **Head**
Sample Size: **0.161 g**
Hair Color: **Brown**
Treatment:
Shampoo: **V05**

Date Collected: **10/26/2011**
Date Received: **12/1/2011**
Date Completed: **12/3/2011**

Method: **ICP-MS**
<dl: **less than detection limit**
µg/g = ppm

Metals are listed in descending priority order based upon data from the Agency for Toxic Substances and Disease Registry which considers not only the relative toxicity per gram metal, but also the frequency for occurrence of exposure.

HAIR ELEMENTS REPORT
INTRODUCTION

Hair is an excretory tissue that concentrates 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 that has been circulating in blood. Therefore, the Hair Toxic Element Profile provides a screening test for EXPOSURE to potentially toxic elements such as methyl mercury, arsenic, lead, and cadmium.

The Hair Toxic Element Exposure Profile considers the relative toxicity per gram element and the relative frequency of occurrence of exposure to the elements. The reported elements are listed in descending order of importance in accordance with guidelines provided by the U.S. Centers for Disease Control and Prevention. Any metal found at levels equal to or exceeding the reference value (95th percentile) will generate interpretive text for that element in the body of the report that follows.

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, occupation, diet analysis 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.

Copper

An elevated 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 (very common), and washing hair in acidic water carried through Cu pipes. In the case of contamination from hair treatments, other elements (aluminum, silver, nickel, titanium) may also be elevated.

Copper is used extensively in sanitation and in the production of kitchen utensils, and thermal and electric conductors. Copper solutions are used in industrial processes such as electroplating, printed circuit production, textile production, and as catalysts in chemical processes. Albeit reduced, Cu-sulfate is sometimes used in agriculture (vineyards, orchards). Other sources of Cu exposure include contaminated food or drinking water, and excessive Cu supplementation, particularly in combination with low intake of zinc or molybdenum. Insufficient intake of competitively absorbed elements such as zinc or molybdenum can lead to, or worsen Cu excess. Cu toxicity significantly compromises zinc homeostasis.

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 serum, whole blood or blood cell elements analysis. Fecal Cu levels can be measured as indication of exposure and approximation of assimilation.

Aluminum

The Aluminum (Al) level in hair is a reliable indicator of assimilation of this element, provided that hair preparations have not added exogenous Al. Al is a nonessential element that can be toxic if excessively assimilated into cells.

Excess Al can inhibit the formation of alpha-keto glutarate and result in toxic levels of ammonia in tissues. Al can bind to phosphorylated bases on DNA and disrupt protein synthesis and catabolism. Al excess should be considered when symptoms of presenile dementia or Alzheimer’s disease are observed. Hair Al is often elevated in children and adults with behavioral/learning disorders such as ADD, ADHD, and autism. Individuals with renal problems or on renal dialysis may have elevated Al.

Al is one of the most abundant metallic elements and due to its light weight, tensile strength and corrosion-resistant oxide coat, it is utilized in a wide variety of industrial and household applications (packing materials, containers, kitchen utensils, automobile and airplane components, and building materials). Commercial Al alloys commonly include copper, manganese, zinc, silicon, and magnesium. Inorganic aluminum compounds are found in drinking water, skin tanning solutions, cosmetics, mordants and coagulating agents. Al is used as a catalyst in the production of marble cement, concrete, and in the paper and enamel industries. Organoaluminum compounds are utilized to adjust the viscosity of varnishes, to impregnate textiles, and for antitransparents is cosmetics. Other sources of Al include antacids, baking powder, process cheese and other foods, and some vaccines. Analyses performed at DDI indicate extremely high levels of Al in the majority of ”colloidal mineral” products.

Al has neurotoxic effects at high levels, but low levels of accumulation may not elicit immediate symptoms. Early symptoms of Al burden may include: fatigue, headache, and symptoms of phosphate depletion.

A post-Desferrioxamine or EDTA urine elements test can be used to corroborate Al exposure. Al can be effectively complexed and excreted with silicon (J. Environ. Pathol. Toxicol. Oncol., 13(3):205-7, 1994). A complex of malic acid and Mg has been reported to be quite effective in lowering Al levels (DDI clients), and appears to be very effective in the treatment of fibromyalgia.

Uranium High

The levels of Uranium (U) in hair usually reflect levels of U in other tissues. However, hair may be externally contaminated by shampoos or hair products that contain U.

U is a nonessential element that is very abundant in rock, particularly granite, lignite, monazite sands, and phosphate rocks. U is present at widely varying levels in drinking water, root vegetables, and present in high phosphate fertilizers. Other sources of U include: ceramics, some colored glass, many household products and tailings from U mines. Spent U rods have been milled into armor piercing bullets and missile heads.

Uranyl cations bind tenaciously to protein, phosphate, nucleotides, and bone, where it substitutes for Ca. Published data are sparse, but there appears to be a correlation between U exposure, nephrotoxicity and cancer. Kidney and bone are the primary sites of U accumulation.

All isotopes of U are radioactive; 238U is the most abundant and lowest energy emitter. It is important to note that the measured result, which is 238U, does NOT necessarily indicate or imply exposure to highly enriched 235U, which is used in nuclear power and weaponry.

Chronic fatigue is often reported in association with hair U levels >0.5 µg/g (DDI observations). U is rapidly cleared from blood and deposited in tissues. Currently, DTPA is the only effective chelating agent for ACUTE U poisoning. However, it must be administered immediately and is not effective once U has transferred from blood to tissues. Currently there are no available chelators or complexing agents that have been established to be effective for ameliorating U retention associated with long-term, low-level exposure to U.

Urine or fecal elements analysis can be performed to confirm recent or ongoing exposure to U. Because U is such a potent nephrotoxin, one might test for urinary wasting of amino acids and low molecular weight proteins (B-2-microglobulin) in patients with markedly elevated hair U levels.