



# Elemental Analysis Hair



Parkgate House  
356 West Barnes Lane  
New Malden, Surrey KT3 6NB

63 Zillicoa Street  
Asheville, NC 28801 USA

Patient: **HENDRIKA BELIEN**  
DOB: February 08, 1947  
Sex: F  
MRN: 0001709206

Order Number: **E3050314**  
Completed: November 09, 2011  
Received: November 05, 2011  
Collected: November 01, 2011  
Route Number: A140741

Equilibrium Vital Health Centre  
Yatra W M Da Silveira Barbosa  
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1054 MC, Amsterdam  
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## Toxic Elements

Element	Reference Range	Reference Range in µg/g
Aluminum	0.8	<= 17.3
Antimony	0.003	<= 0.016
Arsenic	0.041	<= 0.080
Barium	0.27	<= 1.70
Bismuth	<dl	<= 0.178
Cadmium	0.006	<= 0.022
Gadolinium	<dl	<= 0.0005
Lead	0.107	<= 0.700
Mercury	0.03	<= 1.32
Nickel	>4.59	<= 0.55
Rhodium	<dl	<= 0.0005
Rubidium	0.004	<= 0.040
Thallium	<dl	<= 0.0004
Tin	0.045	<= 0.149
Uranium	0.0062	<= 0.0057

## Nutrient Elements

Element	Reference Range	Reference Range in µg/g
Calcium	357	192-1,588
Chromium	0.13	0.01-1.58
Cobalt	0.044	0.001-0.129
Copper	16	8-136
Iron	9.5	5.2-24.4
Magnesium	60	11-122
Manganese	0.07	0.04-1.93
Molybdenum	0.02	0.01-1.24
Phosphorous	127	104-206
Selenium	0.83	0.58-1.13
Sodium	13	14-426
Strontium	0.94	0.01-4.40
Sulfur	49,518	41,781-60,894
Vanadium	0.047	0.003-0.108
Zinc	166	119-245

### Reference Range

Lithium	<dl	<= 0.302
Potassium	3	<= 174

## Ratios

	Inside Range	Outside Range	Reference Range
Ca/Mg	6		5-29
Ca/P	3		1-9

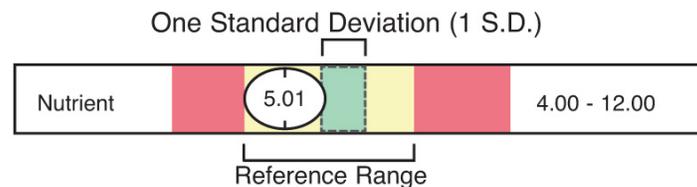
## Commentary

This test has been developed and its performance characteristics determined by Genova Diagnostics, Inc. It has not been cleared or approved by the U.S. Food and Drug Administration.

Reference ranges are derived from a healthy adult population without hair treatments such as perms, dyes or bleach.

**NOTE:** Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Comments regarding clinical significance for the various elements are based on endogenous concentrations. Hair Analysis is always a reflection of both endogenous levels and external contamination (elements on the hair surface), thus is considered a screen rather than a definitive diagnostic assessment of body burden.

The **Reference Range** is a statistical interval representing 95% or 2 Standard Deviations (2 S.D.) of the reference population. One Standard Deviation (1 S.D.) is a statistical interval representing 68% of the reference range population. Values between 1 and 2 S.D. are not necessarily abnormal. Clinical correlation is suggested. (See example below)



**NOTE:** The following comments regarding clinical significance for the elements tested in this profile are based on *endogenous* concentrations. It should be noted that Hair Analysis is a reflection of both endogenous levels *and* external contamination (elements on the hair surface), thus is considered a screen rather than a definitive diagnostic assessment of tissue levels. Confirmation of toxicity may be accomplished via blood or urine testing. Provocative challenge urine testing (with the use of a chelating agent) can reflect tissue stores from previous exposure, whereas non-provoked urine or blood tests will reflect current exposure.

**NOTE:** Hair iron, phosphorus, sodium, and potassium are generally not thought to reflect dietary intake or body stores of these elements; however, abnormal hair levels may be associated with certain drugs and clinical conditions. Elevated hair iron may be found in smokers, x-ray technicians and individuals with certain forms of cancer. Notably low or high hair phosphorus is consistent with abnormal calcium and/or magnesium metabolism. Hair phosphorus also is typically elevated with kidney dialysis, and may be depressed in chronic hepatitis. Regular swimming in pools can elevate hair sodium. Although hair levels of sodium and potassium may be clinically significant in the presence of cystic fibrosis, celiac disease, and hyperparathyroidism, hair levels do not generally reflect tissue concentrations of these elements.

**Calcium** (Ca) level is within the reference range. Hair Ca correlates with long term dietary intake, absorption from the GI tract and retention. The hair Ca level does not necessarily reflect current serum calcium or calcium ion concentrations and may not have a linear or direct relationship with tissue deposition or bone density.

**Cobalt** (Co) level is within the reference range.

**Chromium** (Cr) is within the reference range.

**Iron** (Fe) is within the reference range. Please refer to note at beginning of commentary section.

**Magnesium** (Mg) is within the reference range.

**Manganese** (Mn) is within the reference range.

**Molybdenum** (Mo) is within the reference range.

### Commentary

**Nickel** (Ni) is above the reference range. Hair Ni level correlates with chronic exposures and ingestion. In blood, Ni binds to albumin, globulins and amino acids, and is deposited in leukocytes. In cells, it binds to mitochondrial and cytosolic proteins. In so doing, it can displace zinc and copper, thereby activating, inhibiting, or dysregulating enzymes. A nickel exposure may hypersensitize the immune system, resulting in inflammatory responses to many environmental substances to which there was formerly little or no response. Possible symptoms of nickel excess include panallergy with rhinitis, sinusitis, conjunctivitis and asthma. Other symptoms may include vertigo, weakness and fatigue, nausea and headache. Nickel contact allergy ("nickel itch") or contact dermatitis is not necessarily reflected by elevated hair Ni.

**Phosphorus** (P) is within the reference range. Please refer to note at beginning of commentary section.

**Potassium** (K) is within the reference range. Please refer to note at beginning of commentary section.

**Selenium** (Se) is within the reference range.

**Sodium** (Na) is below the reference range. Please refer to note at beginning of commentary section.

**Strontium** (Sr) is within the reference range.

**Sulfur** (S) is within the reference range.

**Uranium** (U) is above the reference range. Hair levels of uranium may reflect past or chronic ingestion. Most exposure comes from natural uranium in ground and drinking water. The U238 isotope of uranium is measured by GSDL, and this isotope comprises more than 99% of naturally occurring uranium. Radioactivity danger from trace quantities of natural uranium is slight because of its very long half life (billions of years). The finding of elevated U238 in this test does not imply nor does it rule out exposure to enriched uranium fuel (U235) or to other radioactive isotopes which may be radiation hazards.

The major toxicological concern of U238 excess is biochemical rather than radiochemical. U is a reactive element which is able to combine with and affect the metabolisms of: lactate, citrate, pyruvate, carbonate and phosphate. Eventually, U deposits in kidney, bone, liver and spleen. The primary symptom of low level chronic uranium excess is chronic fatigue. Possible conditions from more severe uranium contaminations include damage to kidney glomeruli with disordered renal transport (proteinuria, albuminuria, and hyperaminoaciduria) and hematopoiesis in bone marrow.

**Vanadium** (V) is within the reference range.

**Zinc** (Zn) is within the reference range.