



3425 Corporate Way
Duluth, GA 30096

Patient:

DOB:
Sex:
MRN:

Nutrient Elements

Element	Reference Range	Reference Range
Chromium <i>(whole blood)</i>	0.18	0.18-2.78 mcg/L
Copper <i>(plasma)</i>	118.8	75.3-192.0 mcg/dL
Magnesium <i>(RBC)</i>	38.0	30.1-56.5 mcg/g
Manganese <i>(whole blood)</i>	3.7	3.0-16.5 mcg/L
Potassium <i>(RBC)</i>	2,729	2,220-3,626 mcg/g
Selenium <i>(whole blood)</i>	109	109-330 mcg/L
Vanadium <i>(whole blood)</i>	1.73	1.69-23.89 mcg/L
Zinc <i>(plasma)</i>	69.7	64.3-159.4 mcg/dL

Toxic Elements*

Element	Reference Range	Reference Range
Lead	3.34	<= 2.81 mcg/dL
Mercury	35.13	<= 4.35 mcg/L
Arsenic	5.8	<= 13.7 mcg/L
Cadmium	<DL	<= 1.22 mcg/L
Tin	<DL	<= 0.39 mcg/L

* All toxic Elements are measured in whole blood.

The Elemental reference ranges are based on an adult population.

Commentary

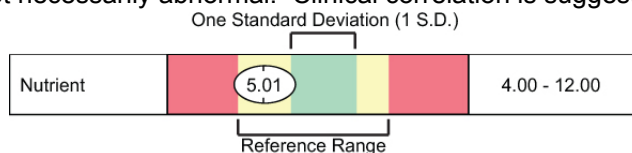
Testing Methodology: ICP-MS
 The assay for elemental analysis has been updated and some reference ranges have been changed accordingly.

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.

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the responsibility of the practitioner.

Commentary

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 population. Values between 1 and 2 S.D. are not necessarily abnormal. Clinical correlation is suggested. (See example below)



The reference range for Lead is set at NHANES 95th percentile.

https://www.cdc.gov/biomonitoring/pdf/FourthReport_UpdatedTables_Volume1_Jan2017.pdf

The reference range for Cadmium is set at NHANES 95th percentile.

https://www.cdc.gov/biomonitoring/pdf/FourthReport_UpdatedTables_Volume1_Jan2017.pdf

The reference range for Mercury is set at NHANES 95th percentile.

https://www.cdc.gov/biomonitoring/pdf/FourthReport_UpdatedTables_Volume1_Jan2017.pdf

Lead is above the reference range. This element has multiple toxic effects and many possible sources. Some sources are as follows: leaded or soldered joints in water systems, contaminated herbal preparations and teas, chips of old lead-containing paint, art supplies, colored glass kits, bullets, fishing sinkers, balance weights, radiation shields, lead-acid batteries, bearing alloys, babbitt metal, certain ceramic glazes or pigments, sewage sludge, and soils and vegetation along highways.

Calcium, zinc and/or iron deficiency conditions enhance uptake of ingested lead. In the body, absorbed lead soon leaves blood plasma and accumulates in erythrocytes where it binds to hemoglobin and thiols and also to the cell membrane.

Eventually, lead leaves peripheral circulation and deposits primarily in bone tissue and also in the aorta, kidneys, and other organs. This element can bind to enzymes, proteins and membranes that present sulfhydryl, phosphate, amino and hydroxyl groups. Lead interferes with enzymes that form heme, shortens erythrocyte life span, disrupts iron transport in erythropoietic cells, affects renal transport of uric acid, reduces cytochrome P-450 activity, and is synergistically toxic with cadmium and mercury. In children, manifestations of lead excess may include encephalopathy with loss of IQ, and behavioral disorders. Adults and children may present with anorexia, metallic taste, insomnia, headaches, fatigue, anemia, reticulocytosis, and uricemia. Erythropoietic porphyria or porphyrinuria may occur.

Mercury is above the reference range. Possible sources of mercury (Hg) include: contaminated shellfish or seafood, contaminated water supplies, dental amalgams and/or recent dental work, laboratory equipment, barometers, thermometers, certain specially-formulated fungicides, old paint containing Hg fungicide and mining and smelting operations.

Mercury has strong affinity for sulfhydryl (-SH) sites on proteins and enzymes throughout the body and deposits in many tissues and organs. The kidneys eventually carry much of the body burden regardless of route of exposure or chemical form of the Hg. Elemental and inorganic Hg eventually distribute predominately to liver and kidney. Excretion is slow - kidney Hg via urine and liver Hg via feces. Elemental Hg vapor may be dissolved in blood, may enter erythrocytes, and can deposit in brain tissue. Organic Hg (methyl, ethyl) binds to enzymes, proteins and glutathione in blood and various tissues, circulates rather freely, and has a long retention half-time in the body (approximately two months). Hg interferes with catalase, monoamine oxidase, mixed-function oxidases and cytochrome P-450 in liver tissue, and stimulates thionein formation and is distributed there partly as mercury-metallothionein. In cell mitochondria, organic Hg, especially methyl mercury, disrupts respiration, decreases synthesis of RNA and can be mutagenic by altering chromosome structure.

Commentary

Signs and symptoms consistent with Hg contamination are variable and may include: metallic taste, increased salivation, paresthesias with decreased senses of hearing touch and vision, hypertension, headaches, fatigue, insomnia, and fine muscle tremor. A hallmark symptom is emotional disturbance, sometimes a bipolar depression but often a form of excitability and lack of ability for mental concentration.