Sample Report TEE10

SEX: Female
DOB: 01/01/1995

AGE: 24

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

Toxic & Essential Elements; Whole Blood

ESSENTIAL AND OTHER ELEMENTS					PERCENTILE 2.5th 16th 50th 84th 97.5th
		RESULT	UNIT	REFERENCE INTERVAL	
Calcium	(Ca)	6.2	mg/dL	4.8 - 7.1	
Magnesium	(Mg)	3.8	mg/dL	3 - 4.2	
Copper	(Cu)	84	µg/dL	65 - 130	
Zinc	(Zn)	605	µg/dL	480 - 780	
Manganese	(Mn)	10	µg/L	4 - 22	
Chromium	(Cr)	0.24	µg/L	0.2 - 0.80	
Lithium	(Li)	0.8	µg/L	0.4 - 20	
Selenium	(Se)	178	µg/L	140 - 350	
Strontium	(Sr)	20	µg/L	10 - 45	
Molybdenum	(Mo)	0.7	µg/L	0.3 - 2.5	
Vanadium	(V)	0.06	µg/L	0.04 - 0.30	

TOXIC METALS					PERCENTILE 95th 99th
		RESULT	UNIT	REFERENCE INTERVAL	
Arsenic	(As)	1.7	µg/L	< 9.0	
Barium	(Ba)	1.0	µg/L	< 4.0	
Cadmium	(Cd)	0.6	µg/L	< 1.0	
Cobalt	(Co)	0.4	µg/L	< 0.8	
Lead	(Pb)	1.6	µg/dL	< 3.0	
Mercury	(Hg)	8.3	µg/L	< 4.5	
Nickel	(Ni)	< 1.5	µg/L	< 3.0	
Platinum	(Pt)	< 0.05	µg/L	< 0.10	
Thallium	(Tl)	< 0.05	µg/L	< 0.50	
Tungsten	(W)	< 0.03	µg/L	< 0.10	
Uranium	(U)	< 0.02	µg/L	< 0.10	

SPECIMEN DATA

Comments:

Date Collected: **02/19/2019**
Date Received: **02/21/2019**
Date Reported: **02/22/2019**

Time Collected: **11:00 AM**
Fasting: **No**

Methodology: **ICP-MS**

Blood lead levels in the range of 5-9 µg/dL have been associated with adverse health effects in children aged 6 years and younger.

LAB #: Sample Report
PATIENT: Sample Patient
ID:
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AGE: 24

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DOCTOR: Sample Doctor
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Essential Elements; Serum

ESSENTIAL ELEMENTS		RESULT	UNIT	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Calcium	(Ca)	**9.5**	mg/dL	8.9- 10.3	
Magnesium	(Mg)	**2.1**	mg/dL	1.7- 2.5	
Sodium	(Na)	**138**	mEq/L	135- 145	
Potassium	(K)	**4.0**	mEq/L	3.5- 5.0	
Phosphorus	(P)	**4.2**	mg/dL	2.5- 4.5	
Iron	(Fe)	**38**	µg/dL	50- 170	

INFORMATION

Sodium and Potassium
Sodium (Na^+) and potassium (K^+) are electrolytes that affect most metabolic functions. They serve to maintain osmotic pressure and hydration of various body fluid compartments, body pH and regulation of heart and muscle functions. Electrolytes are also involved in oxidation-reduction reactions and participate in essential enzymatic reactions. Electrolytes can be affected by state of hydration. Hemolysis can result in falsely elevated K^+.

Magnesium
Magnesium (Mg) is a major intracellular cation that is involved in over three hundred enzymatic reactions in the body. Little is known about the factors affecting serum Mg, but the parathyroid gland appears to be involved. Low serum Mg levels may be associated with poor diet/malabsorption, diabetes, hyperthyroidism, hypoparathyroidism, myocardial infarction, congestive heart failure, liver cirrhosis, alcoholism and diuresis. Increased serum Mg levels may be associated with renal failure, dehydration, severe diabetic acidosis, and Addison's disease.

Calcium
Although 99% of calcium exists in bones and teeth, serum calcium (Ca) is of greatest clinical concern. Ca regulates transmission of nerve impulses, muscle contraction, coagulation, and numerous enzymatic reactions. The uptake and release of Ca from bone is regulated by parathyroid hormone, and serum Ca levels are inversely proportional to phosphorus levels. Low serum Ca results in muscle tetany while high Ca levels result in lowered neuromuscular excitability, muscle weakness, and other more complex symptoms. Marked variations in serum Ca may result from parathyroid gland or bone disease, poor diet/intestinal absorption of calcium (vitamin D), kidney disease, and other abnormalities.

Inorganic Phosphorus
Measurements of serum inorganic phosphorus (phosphate or PO_4) are used in the diagnosis and treatment of disorders including parathyroid gland and kidney diseases, and vitamin D status. Serum PO_4 is regulated by coordinated efforts of vitamin D and parathyroid hormone, and PO_4 levels are inversely proportional to Ca levels. Low PO_4 may be associated with fatigue, paresthesias and muscle weakness, while elevated PO_4 may be associated with hypoparathyroidism, hyperthyroidism, hypocalcemia and tetany.

Iron
Measurements of non-heme, serum iron (Fe) are used in the diagnosis and treatment of diseases such as Fe deficiency anemia, Fe toxicity and acute or chronic hemochromatosis. The most comprehensive assessment of Fe status includes transferrin saturation and ferritin.

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Methodology: **Na, K ISE**
Ca, Mg, P, Fe Spectrophotometry

v08.10

WHOLE BLOOD ELEMENT REPORT

INTRODUCTION

This analysis of elements in whole blood was performed by ICP Mass Spectroscopy following specimen digestion with nitric acid in a closed container microwave oven system. This procedure measures the total concentration of an element in whole blood, regardless of biochemical form and regardless of partitioning of the element in blood fractions. For units of measurement, mg/L is approximately equivalent to ppm, and mcg/L is approximately equivalent to ppb.

Whole blood element analysis is intended to be a diagnostic method that assists in determining imbalance, insufficiency, or excess of certain elements that have essential or beneficial functions. Additional testing of blood fractions or other body tissues may be necessary for differential diagnosis of imbalances. Additional testing also may be necessary to assess specific dysfunctions of assimilation, transport, retention, or excretion of elements. Whole blood element analysis is additionally intended to determine elevated or excessive levels of eleven potentially toxic elements.

If an element is sufficiently abnormal per the whole blood measurement, a descriptive text is included with the report. For elements with essential or beneficial functions, a text will print if the measured result is 1.5 standard deviations (SD) above or below the mean of the reference population. Exceptions are made for chromium and vanadium; a text will print if the measured result is 2 standard devations above or below the mean. For potentially toxic elements, a text prints whenever the measured result exceeds the expected range.

Doctor's Data states the reference range as + 1SD from the mean of the reference population. This is considered to be the nutritionally and physiologically optimal range for elements with essential or beneficial functions. Physiological imbalance corresponds to levels beyond + 1SD but pathological consequences are not expected until the blood level is beyond + 2SD. Element levels beyond + 2SD may only be temporary nutritional problems or they may reflect a failure of homeostasis to control blood quantities. Pathological consequences depend upon cell and tissue functions which are disrupted by such levels.

MERCURY HIGH

The concentration of mercury (Hg) is abnormally high in this blood specimen. Elevated blood Hg indicates higher than average exposure to the metal, but does not provide information about net bodily retention of Hg. Whole blood constitutes both organic (RBC) and inorganic (serum) Hg. However, blood Hg is not indicative of past exposures if the Hg has cleared the blood and deposited in other tissues. The biological half-lives of inorganic and organic Hg in blood are about 3 days and 60 days, respectively. Blood Hg levels are typically higher than average in "high-end" fish consumers.

The symptomatology of Hg excess can depend on many factors: the chemical form of absorbed Hg and its transport in body tissues, presence of other synergistic toxics (Pb and Cd have such effects), presence of disease that depletes or inactivates lymphocytes or is immunosuppressive, organ levels of xenobiotic chemicals and sulfhydryl-bearing metabolites (e.g. glutathione), and

the concentration of protective nutrients, (e.g. zinc, selenium, vitamin E). Early signs of excessive Hg exposure include: decreased senses of touch, hearing, vision and taste, metallic taste in the mouth, fatigue or lack of physical endurance, and increased salivation. Symptoms may progress with moderate or chronic exposure and retention include: anorexia, numbness and paresthesias, headaches, hypertension, irritability and excitability, and immune suppression, possibly immune dysregulation. Advanced disease processes from Hg toxicity include: tremors and incoordination, anemia, psychoses, manic behaviors, possibly autoimmune disorders, renal dysfunction or failure.

Mercury is commonly used in: dental amalgams, explosive detonators, in elemental or liquid form for thermometers, barometers, and laboratory equipment; batteries and electrodes; and in fungicides and pesticides. The use of Hg as a funcicial/pesticide (including that in paints) has declined somewhat due to environmental concerns, but mercury residues persist from past use. Methylmercury, the common, most neurotoxic form, results from methylation of hg in aquatic biota or sediments, both freshwater and ocean sediments. Methylmercury accumulates in aquatic animals and fish and is concentrated up the food chain reaching high concentrations in large fish and predatory birds. Except for fish, the intake of dietary mercury is negligible unless food is contaminated with one of the previously listed forms/sources.

Measurement of fecal Hg provides an indication of exposure to inorganic mercury from dental amalgams. Net retention of Hg in the body can be assessed by comparison of pre- and post-provocation urinalysis using DMPS, DMSA or D-penicillamine.

BIBLIOGRAPHY FOR MERCURY

1. Suzuki T. et al eds, Advances in Mercury Toxicology, Plenum Press, New York, NY, 1991.

2. World Health Organization: ”Methylmercury”, Environ. Health Criteria 101 (1990); ”Inorganic Mercury”, Environ. Health Criteria118 (1991), WHO, Geneva, Switzerland.

3. Tsalev D.L. and Z.K. Zaprianov, Atomic Absorption Spectrometryin Occupational and Environmental Health Practice, CRC Press, Boca Raton, FL, 1983, pp 158-69.

4. Birke G. et al ”Studies on Humans Exposed to Methyl Mercury Through Fish Consumption”, Arch Environ Health 25, 1972, pp 77-91.

5. Ishihara N. et al ”Inorganic and Organic Mercury in Blood, Urineand Hair in Low Level Mercury Vapor Exposure” Int. Arch. Occup. Environ. Health 40, 1978, pp 249-53.

6. Werbach M.R. Nutritional Influences on Illness, 2nd ed, Third Line Press, Tarzana CA, 1993, pp 349, 647, 679.