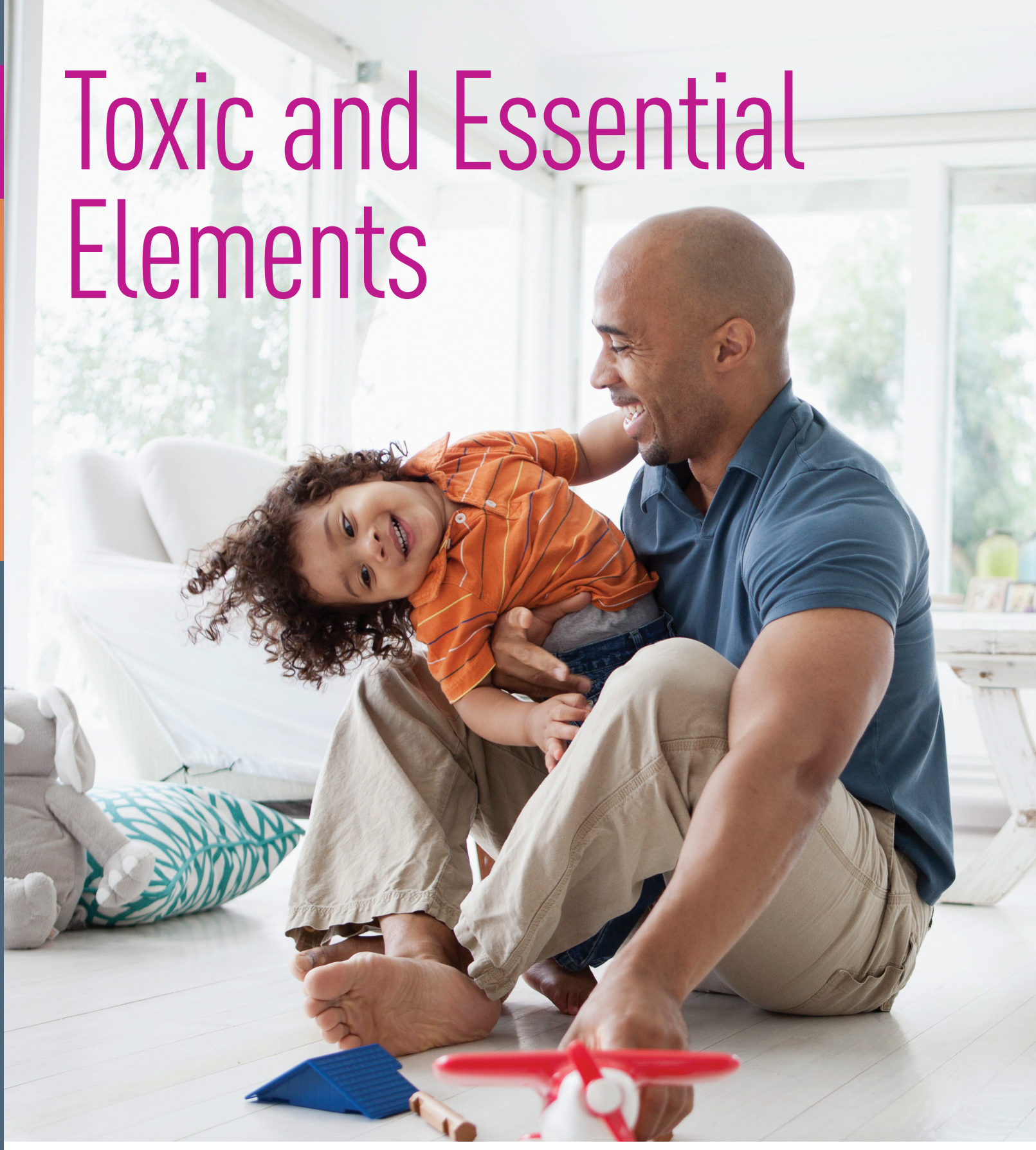
Toxic and Essential Elements



Assessment of Key Minerals and Harmful Metals

- Whole Blood, Red Blood Cell and Serum Elements
- Urine Toxic and Essential Elements
- Creatinine Clearance
- Hair Elements
- Stool Toxic Metals
- Implant Metals

DOCTOR'S DATA INC.

SCIENCE + INSIGHT

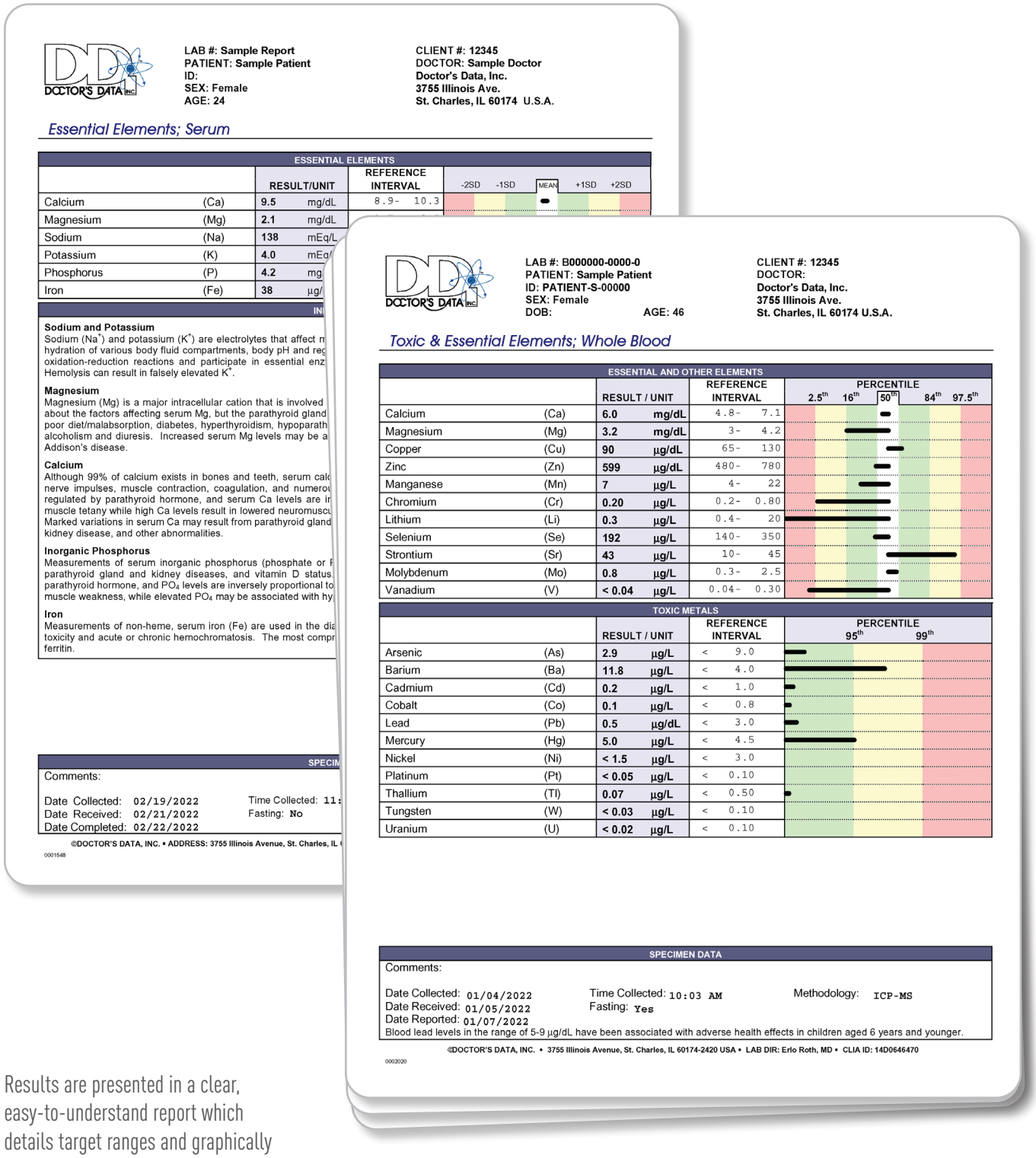
Toxic and Essential Elements

Elements are the basic building blocks of all chemical compounds, and human exposure to them occurs both from natural and anthropogenic sources. Many elements are considered nutrients and are essential for the proper functioning of the body. These are generally divided between macrominerals such as calcium, magnesium, potassium, sodium and zinc, and trace minerals including selenium, iodine, boron and molybdenum.

Conversely, there are a number of elements that are toxic to the human body, interfere with its functioning and undermine health—such as mercury, lead, cadmium, aluminum, and arsenic. These toxic metals have no known physiological functions. They can be toxic to organ systems and may disrupt the balance of essential nutrients. Toxic metals and essential element status can be assessed in urine, blood, feces and hair.

Doctor's Data has always employed the best-available techniques as a specialist and pioneer in essential and toxic elemental testing. In fact, we were one of the first clinical reference laboratories in the world to employ ICP-MS and high-resolution ICP-MS for elemental analysis.

Deficiencies of essential trace elements or excessive amounts of
heavy metals in the human body
can cause significant health effects.



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

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

Essential Elements; Serum

ESSENTIAL ELEMENTS

		RESULT/UNIT	REFERENCE INTERVAL
Calcium	(Ca)	9.5 mg/dL	8.9 - 10.3
Magnesium	(Mg)	2.1 mg/dL	
Sodium	(Na)	138 mEq/L	
Potassium	(K)	4.0 mEq/	
Phosphorus	(P)	4.2 mg	
Iron	(Fe)	38 µg/	

-2SD -1SD MEAN +1SD +2SD

Sodium and Potassium
Sodium (Na^+) and potassium (K^+) are electrolytes that affect n
hydration of various body fluid compartments, body pH and reg
oxidation-reduction reactions and participate in essential enz
Hemolysis can result in falsely elevated K^+.

Magnesium
Magnesium (Mg) is a major intracellular cation that is involved
about the factors affecting serum Mg, but the parathyroid gland
poor diet/malabsorption, diabetes, hyperthyroidism, hypoparath
alcoholism and diuresis. Increased serum Mg levels may be a
Addison's disease.

Calcium
Although 99% of calcium exists in bones and teeth, serum calc
nerve impulses, muscle contraction, coagulation, and numerou
regulated by parathyroid hormone, and serum Ca levels are ir
muscle tetany while high Ca levels result in lowered neuromuscu
Marked variations in serum Ca may result from parathyroid gland
kidney disease, and other abnormalities.

Inorganic Phosphorus
Measurements of serum inorganic phosphorus (phosphate or P
parathyroid gland and kidney diseases, and vitamin D status.
parathyroid hormone, and PO_4 levels are inversely proportional to
muscle weakness, while elevated PO_4 may be associated with hy

Iron
Measurements of non-heme, serum iron (Fe) are used in the dia
toxicity and acute or chronic hemochromatosis. The most compr
ferritin.

SPECIM
Comments:

Date Collected: 02/19/2022
Date Received: 02/21/2022
Date Completed: 02/22/2022
Time Collected: 11:
Fasting: No

©DOCTOR'S DATA, INC. • ADDRESS: 3755 Illinois Avenue, St. Charles, IL
0001548

LAB #: B000000-0000-0
PATIENT: Sample Patient
ID: PATIENT-S-00000
SEX: Female
DOB: AGE: 46

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

Toxic & Essential Elements; Whole Blood

ESSENTIAL AND OTHER ELEMENTS

		RESULT / UNIT	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Calcium	(Ca)	6.0 mg/dL	4.8 - 7.1	
Magnesium	(Mg)	3.2 mg/dL	3 - 4.2	
Copper	(Cu)	90 µg/dL	65 - 130	
Zinc	(Zn)	599 µg/dL	480 - 780	
Manganese	(Mn)	7 µg/L	4 - 22	
Chromium	(Cr)	0.20 µg/L	0.2 - 0.80	
Lithium	(Li)	0.3 µg/L	0.4 - 20	
Selenium	(Se)	192 µg/L	140 - 350	
Strontium	(Sr)	43 µg/L	10 - 45	
Molybdenum	(Mo)	0.8 µg/L	0.3 - 2.5	
Vanadium	(V)	< 0.04 µg/L	0.04 - 0.30	

TOXIC METALS

		RESULT / UNIT	REFERENCE INTERVAL	PERCENTILE 95th 99th
Arsenic	(As)	2.9 µg/L	< 9.0	
Barium	(Ba)	11.8 µg/L	< 4.0	
Cadmium	(Cd)	0.2 µg/L	< 1.0	
Cobalt	(Co)	0.1 µg/L	< 0.8	
Lead	(Pb)	0.5 µg/dL	< 3.0	
Mercury	(Hg)	5.0 µg/L	< 4.5	
Nickel	(Ni)	< 1.5 µg/L	< 3.0	
Platinum	(Pt)	< 0.05 µg/L	< 0.10	
Thallium	(Tl)	0.07 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: 01/04/2022
Date Received: 01/05/2022
Date Reported: 01/07/2022
Time Collected: 10:03 AM
Fasting: Yes
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.

©DOCTOR'S DATA, INC. • 3755 Illinois Avenue, St. Charles, IL 60174-2420 USA • LAB DIR: Erlo Roth, MD • CLIA ID: 14D0646470
0002020

Results are presented in a clear, easy-to-understand report which details target ranges and graphically illustrates areas of concern. Result-specific commentary is also provided.

Comprehensive Blood Elements

The standard for diagnosis of lead, mercury or other metal toxicity or poisoning, whole blood metals are also used to assess recent or ongoing exposure to potentially toxic elements. In addition, blood element analysis is ideal for guiding supplementation, and should be performed before and during metal detoxification to evaluate essential element status to ensure treatment safety and effectiveness.

In addition to whole blood, serum elements are used to assess the status of key elements and electrolytes that have important functions in the extracellular fluid compartment of blood, giving a more complete evaluation of total blood element levels.

Red blood cell (RBC) elements tests are used to assess the status of essential elements with important intracellular functions, such as magnesium, copper and zinc. Deficiencies or excesses of these essential elements affect numerous metabolic processes. RBC element analysis is also useful for the assessment of ongoing or recent exposure to specific toxic metals, such as arsenic, cadmium, lead, methylmercury and thallium, that accumulate preferentially in erythrocytes.

Doctor's Data measures essential and toxic metals using ICP-MS for whole blood and red blood cells, and a highly sensitive and specific chemistry analyzer for serum elements.

	Comprehensive Blood Elements	Whole Blood Elements	Implant Metals	Serum Elements	Red Blood Cell Elements
Calcium	✔	✔		✔	✔
Magnesium	✔	✔		✔	✔
Copper	✔	✔			✔
Zinc	✔	✔			✔
Manganese	✔	✔			✔
Lithium	✔	✔			
Chromium	✔	✔	✔		✔
Selenium	✔	✔			✔
Strontium	✔	✔			
Molybdenum	✔	✔	✔		✔
Sodium	✔			✔	
Potassium	✔			✔	✔
Phosphorus	✔			✔	✔
Iron	✔			✔	✔
Boron					✔
Vanadium	✔	✔	✔		✔
Arsenic	✔	✔			✔
Barium	✔	✔			
Cadmium	✔	✔			✔
Cobalt	✔	✔	✔		
Lead	✔	✔			✔
Mercury	✔	✔			✔
Nickel	✔	✔	✔		
Platinum	✔	✔			
Thallium	✔	✔			✔
Titanium			✔		
Tungsten	✔	✔			
Uranium	✔	✔			
Cesium					✔

Compare Elements Profiles

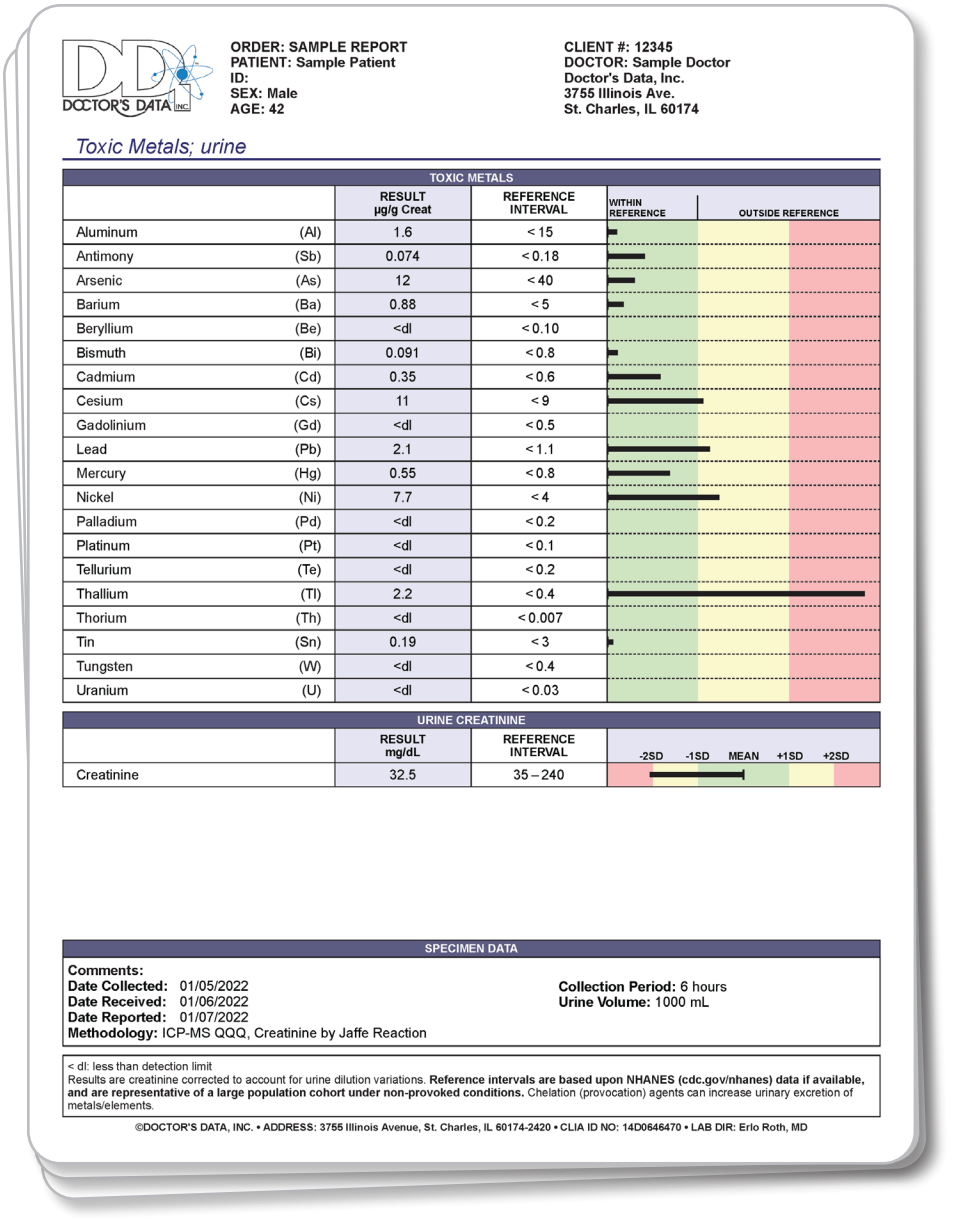
	Urine Toxic and Essential Elements	Urine Toxic Elements	Stool Toxic Metals	Hair Elements	Hair Toxic Elements
Aluminum	✔	✔		✔	✔
Antimony	✔	✔	✔	✔	✔
Arsenic	✔	✔	✔	✔	✔
Barium	✔	✔		✔	✔
Beryllium	✔	✔	✔	✔	✔
Bismuth	✔	✔	✔	✔	✔
Boron	✔			✔	
Bromine					
Cadmium	✔	✔	✔	✔	✔
Calcium	✔			✔	
Cesium	✔	✔			✔
Chromium	✔			✔	✔
Cobalt	✔			✔	✔
Copper	✔		✔	✔	✔
Fluoride					
Gadolinium	✔	✔			✔
Germanium				✔	✔
Gold					✔
Iodine/Iodide				✔	
Iron	✔			✔	
Lead	✔	✔	✔	✔	✔
Lithium	✔			✔	
Magnesium	✔			✔	
Manganese	✔			✔	✔
Mercury	✔	✔	✔	✔	✔
Molybdenum	✔			✔	
Nickel	✔	✔	✔	✔	✔
Palladium	✔	✔			✔
Phosphorus	✔			✔	
Platinum	✔	✔	✔	✔	✔
Potassium	✔			✔	
Rubidium				✔	
Selenium	✔			✔	✔
Silver				✔	✔
Sodium	✔			✔	
Strontium	✔			✔	
Sulfur	✔			✔	
Tellurium	✔	✔			✔
Thallium	✔	✔	✔	✔	✔
Thorium	✔	✔		✔	✔
Tin	✔	✔		✔	✔
Titanium				✔	✔
Tungsten	✔	✔	✔		✔
Uranium	✔	✔	✔	✔	✔
Vanadium	✔			✔	✔
Zinc	✔			✔	✔
Zirconium				✔	

Urine Toxic and Essential Elements

Urine Elements are traditionally used to evaluate exposure to potentially toxic elements and wasting of nutrient elements. Toxic metals do not have any useful physiological function. Instead, they adversely affect virtually every organ system and disrupt the homeostasis of nutrient elements.

Additionally, the comparison of urine element concentrations before and after administration of a chelator can be used to estimate net retention of potentially toxic elements. Subsequent urine element analyses, also following the administration of a chelator, are useful for monitoring the efficacy of metal detoxification therapy. Results are expressed per 24 hours or creatinine corrected to account for urine dilution effects.

Results are presented in a clear, easy-to-understand report which graphically illustrates target ranges.



DOCTOR'S DATA INC

ORDER: SAMPLE REPORT
PATIENT: Sample Patient
ID:
SEX: Male
AGE: 42

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

Toxic Metals; urine

TOXIC METALS

		RESULT µg/g Creat	REFERENCE INTERVAL	WITHIN REFERENCE / OUTSIDE REFERENCE
Aluminum	(Al)	1.6	< 15	
Antimony	(Sb)	0.074	< 0.18	
Arsenic	(As)	12	< 40	
Barium	(Ba)	0.88	< 5	
Beryllium	(Be)	<dl	< 0.10	
Bismuth	(Bi)	0.091	< 0.8	
Cadmium	(Cd)	0.35	< 0.6	
Cesium	(Cs)	11	< 9	
Gadolinium	(Gd)	<dl	< 0.5	
Lead	(Pb)	2.1	< 1.1	
Mercury	(Hg)	0.55	< 0.8	
Nickel	(Ni)	7.7	< 4	
Palladium	(Pd)	<dl	< 0.2	
Platinum	(Pt)	<dl	< 0.1	
Tellurium	(Te)	<dl	< 0.2	
Thallium	(Tl)	2.2	< 0.4	
Thorium	(Th)	<dl	< 0.007	
Tin	(Sn)	0.19	< 3	
Tungsten	(W)	<dl	< 0.4	
Uranium	(U)	<dl	< 0.03	

URINE CREATININE

	RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine	32.5	35 – 240	

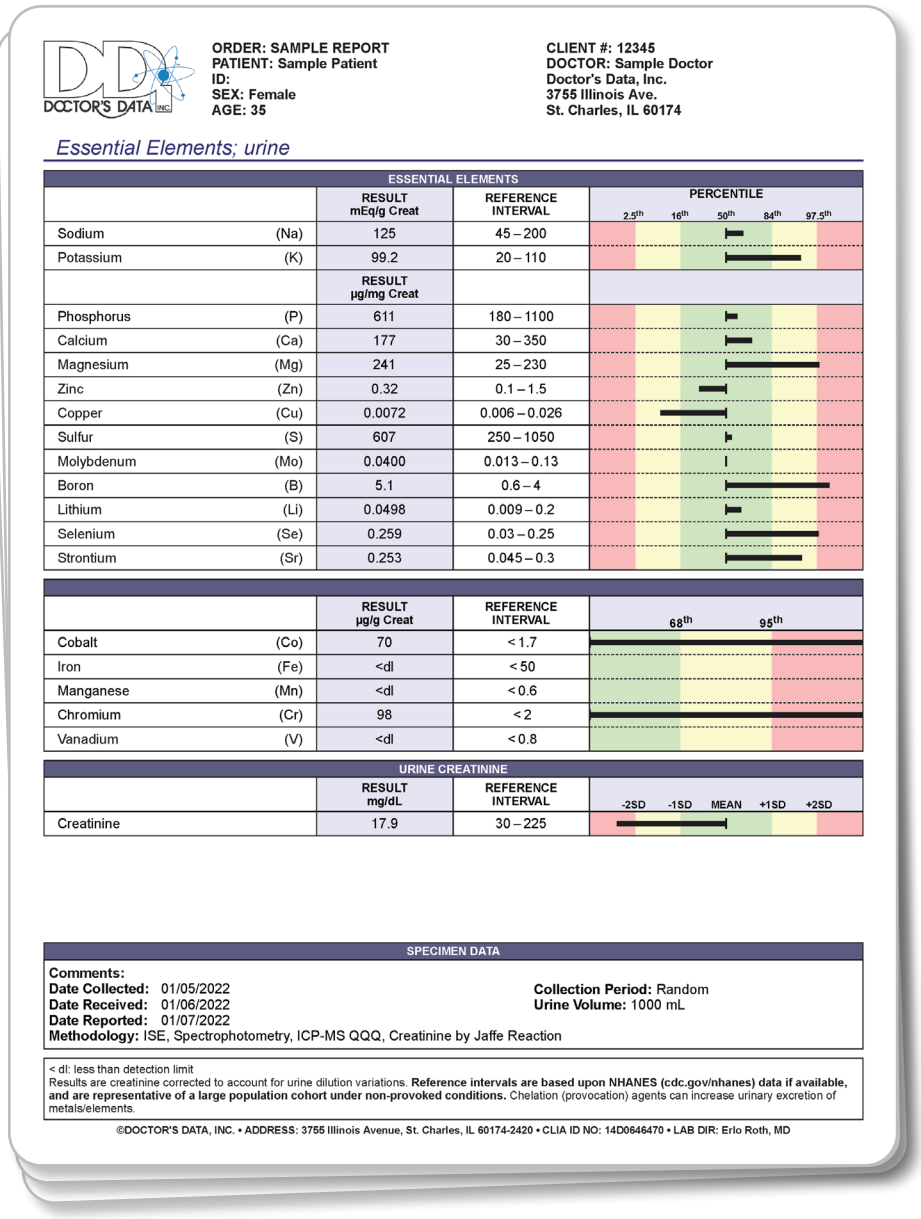
SPECIMEN DATA

Comments:
Date Collected: 01/05/2022
Date Received: 01/06/2022
Date Reported: 01/07/2022
Methodology: ICP-MS QQQ, Creatinine by Jaffe Reaction

Collection Period: 6 hours
Urine Volume: 1000 mL

< dl: less than detection limit
Results are creatinine corrected to account for urine dilution variations. **Reference intervals are based upon NHANES (cdc.gov/nhanes) data if available, and are representative of a large population cohort under non-provoked conditions.** Chelation (provocation) agents can increase urinary excretion of metals/elements.

©DOCTOR'S DATA, INC. • ADDRESS: 3755 Illinois Avenue, St. Charles, IL 60174-2420 • CLIA ID NO: 14D0646470 • LAB DIR: Erlo Roth, MD



DOCTOR'S DATA INC

ORDER: SAMPLE REPORT
PATIENT: Sample Patient
ID:
SEX: Female
AGE: 35

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

Essential Elements; urine

ESSENTIAL ELEMENTS		RESULT mEq/g Creat	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Sodium	(Na)	125	45 – 200	
Potassium	(K)	99.2	20 – 110	
		RESULT µg/mg Creat		
Phosphorus	(P)	611	180 – 1100	
Calcium	(Ca)	177	30 – 350	
Magnesium	(Mg)	241	25 – 230	
Zinc	(Zn)	0.32	0.1 – 1.5	
Copper	(Cu)	0.0072	0.006 – 0.026	
Sulfur	(S)	607	250 – 1050	
Molybdenum	(Mo)	0.0400	0.013 – 0.13	
Boron	(B)	5.1	0.6 – 4	
Lithium	(Li)	0.0498	0.009 – 0.2	
Selenium	(Se)	0.259	0.03 – 0.25	
Strontium	(Sr)	0.253	0.045 – 0.3	

		RESULT µg/g Creat	REFERENCE INTERVAL	68th 95th
Cobalt	(Co)	70	< 1.7	
Iron	(Fe)	<dl	< 50	
Manganese	(Mn)	<dl	< 0.6	
Chromium	(Cr)	98	< 2	
Vanadium	(V)	<dl	< 0.8	

URINE CREATININE		RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine		17.9	30 – 225	

SPECIMEN DATA

Comments:
Date Collected: 01/05/2022
Date Received: 01/06/2022
Date Reported: 01/07/2022
Collection Period: Random
Urine Volume: 1000 mL
Methodology: ISE, Spectrophotometry, ICP-MS QQQ, Creatinine by Jaffe Reaction

< dl: less than detection limit
Results are creatinine corrected to account for urine dilution variations. **Reference intervals are based upon NHANES (cdc.gov/nhanes) data if available, and are representative of a large population cohort under non-provoked conditions.** Chelation (provocation) agents can increase urinary excretion of metals/elements.

These tests are useful for:

- Toxic Element Exposure
- Alopecia
- Bone Density
- Cardiovascular Disease
- Depression
- Dermatitis or Poor Wound Healing
- Detoxifiction Therapy
- Fatigue
- Gastrointestinal Symptoms
- Hypertension
- Immune Function
- Impaired Glucose Tolerance
- Inflammation
- Kidney Function
- Nutritional Deficiencies
- Parkinson's-like Symptoms

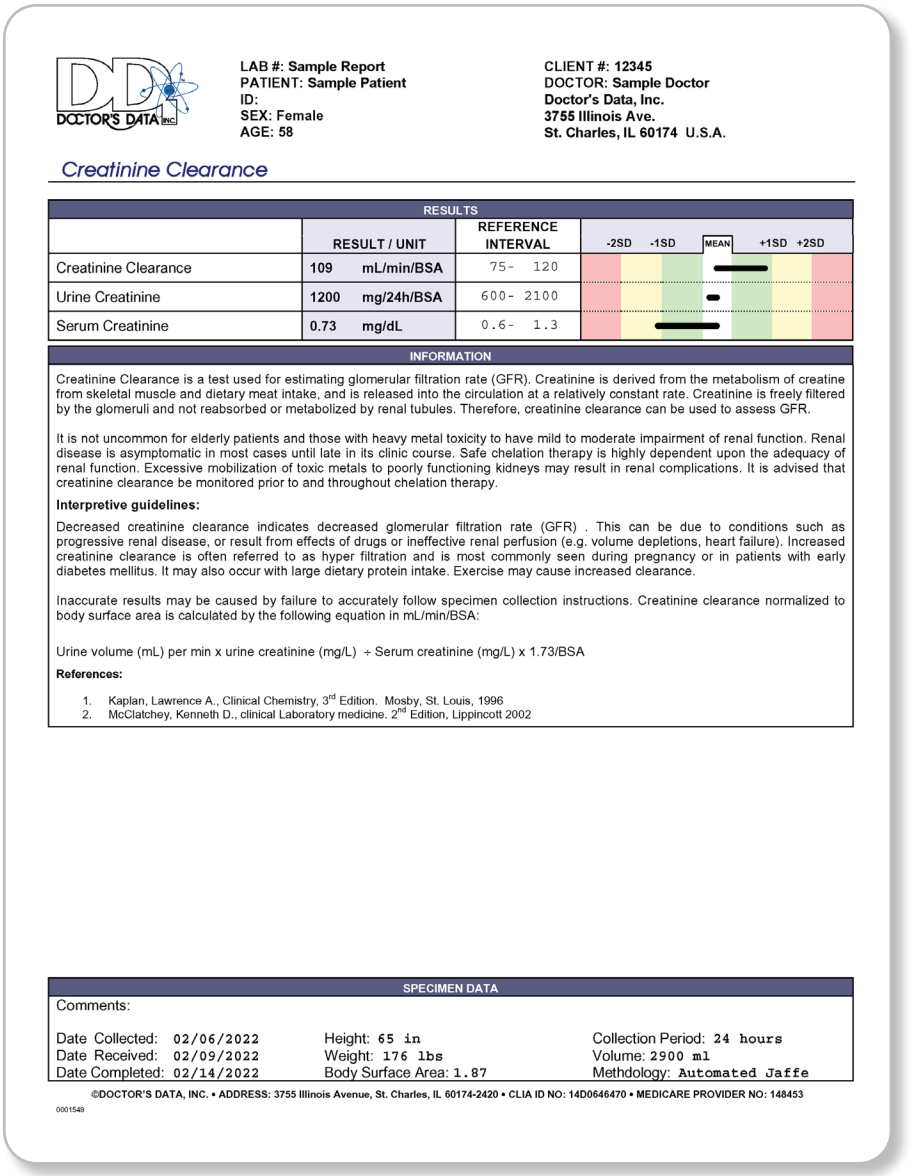
Results are presented in a clear, easy-to-understand report which graphically illustrates target ranges and areas of concern. Result-specific commentary is provided.

Creatinine Clearance

The Creatinine Clearance test is the most widely used test for estimating glomerular filtration rate (GFR) and renal function. GFR assessment is highly recommended for weighing the advisability of prescribing a variety of drugs, including chelating agents.

The Creatinine Clearance test analyzes creatinine in a timed urine collection and a single serum specimen collected during the same period.

Results are presented in a clear, easy-to-understand report which graphically illustrates target ranges.



DOCTOR'S DATA INC

LAB #: Sample Report
PATIENT: Sample Patient
ID:
SEX: Female
AGE: 58

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

Creatinine Clearance

RESULTS

	RESULT / UNIT	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine Clearance	109 mL/min/BSA	75- 120	
Urine Creatinine	1200 mg/24h/BSA	600- 2100	
Serum Creatinine	0.73 mg/dL	0.6- 1.3	

INFORMATION

Creatinine Clearance is a test used for estimating glomerular filtration rate (GFR). Creatinine is derived from the metabolism of creatine from skeletal muscle and dietary meat intake, and is released into the circulation at a relatively constant rate. Creatinine is freely filtered by the glomeruli and not reabsorbed or metabolized by renal tubules. Therefore, creatinine clearance can be used to assess GFR.

It is not uncommon for elderly patients and those with heavy metal toxicity to have mild to moderate impairment of renal function. Renal disease is asymptomatic in most cases until late in its clinic course. Safe chelation therapy is highly dependent upon the adequacy of renal function. Excessive mobilization of toxic metals to poorly functioning kidneys may result in renal complications. It is advised that creatinine clearance be monitored prior to and throughout chelation therapy.

Interpretive guidelines:

Decreased creatinine clearance indicates decreased glomerular filtration rate (GFR) . This can be due to conditions such as progressive renal disease, or result from effects of drugs or ineffective renal perfusion (e.g. volume depletions, heart failure). Increased creatinine clearance is often referred to as hyper filtration and is most commonly seen during pregnancy or in patients with early diabetes mellitus. It may also occur with large dietary protein intake. Exercise may cause increased clearance.

Inaccurate results may be caused by failure to accurately follow specimen collection instructions. Creatinine clearance normalized to body surface area is calculated by the following equation in mL/min/BSA:

Urine volume (mL) per min x urine creatinine (mg/L) ÷ Serum creatinine (mg/L) x 1.73/BSA

References:

1. Kaplan, Lawrence A., Clinical Chemistry, 3rd Edition. Mosby, St. Louis, 1996
2. McClatchey, Kenneth D., clinical Laboratory medicine. 2nd Edition, Lippincott 2002

SPECIMEN DATA

Comments:

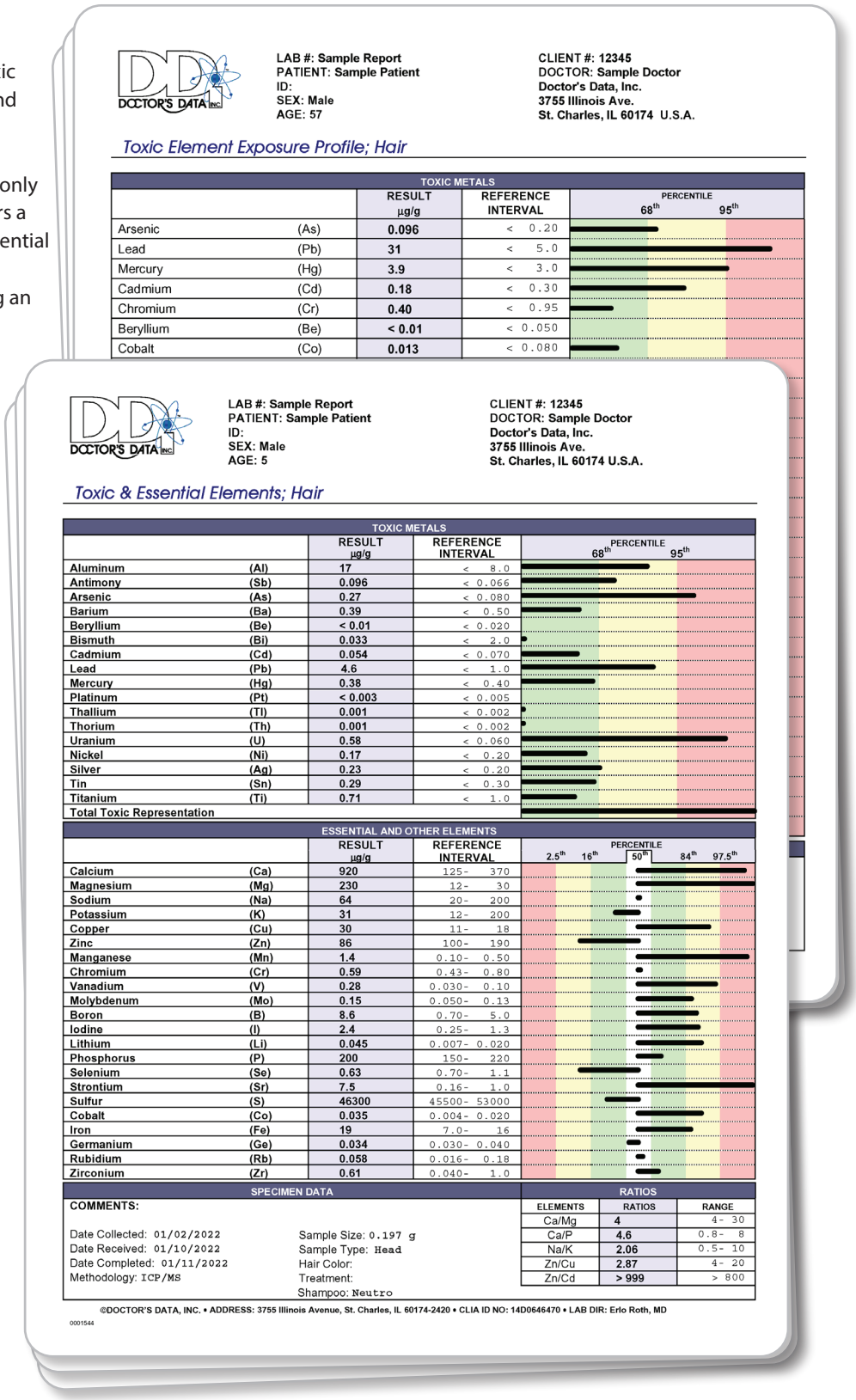
Date Collected: 02/06/2022	Height: 65 in	Collection Period: 24 hours
Date Received: 02/09/2022	Weight: 176 lbs	Volume: 2900 ml
Date Completed: 02/14/2022	Body Surface Area: 1.87	Methdology: Automated Jaffe

0001549

Hair Elements

Hair Elements analysis provides information regarding recent and ongoing exposure to potentially toxic metals, especially methylmercury and arsenic, and time-averaged status of specific nutrient elements. This noninvasive screening test requires only .25 grams of hair. Doctor's Data offers a Hair Elements profile containing essential and toxic elements and a Hair Toxic Element Exposure profile containing an expanded lineup of toxic metals.

A specialist and pioneer in essential and toxic elemental testing since 1972, Doctor's Data has been validated as a supplier of trace element results for the certification of a hair reference material to the European Commission Joint Research Centre.



DOCTOR'S DATA INC

LAB #: Sample Report
PATIENT: Sample Patient
ID:
SEX: Male
AGE: 57

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

Toxic Element Exposure Profile; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th – 95th
Arsenic	(As)	0.096	< 0.20	
Lead	(Pb)	31	< 5.0	
Mercury	(Hg)	3.9	< 3.0	
Cadmium	(Cd)	0.18	< 0.30	
Chromium	(Cr)	0.40	< 0.95	
Beryllium	(Be)	< 0.01	< 0.050	
Cobalt	(Co)	0.013	< 0.080	

DOCTOR'S DATA INC

LAB #: Sample Report
PATIENT: Sample Patient
ID:
SEX: Male
AGE: 5

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

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th – 95th
Aluminum	(Al)	17	< 8.0	
Antimony	(Sb)	0.096	< 0.066	
Arsenic	(As)	0.27	< 0.080	
Barium	(Ba)	0.39	< 0.50	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.033	< 2.0	
Cadmium	(Cd)	0.054	< 0.070	
Lead	(Pb)	4.6	< 1.0	
Mercury	(Hg)	0.38	< 0.40	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	0.001	< 0.002	
Thorium	(Th)	0.001	< 0.002	
Uranium	(U)	0.58	< 0.060	
Nickel	(Ni)	0.17	< 0.20	
Silver	(Ag)	0.23	< 0.20	
Tin	(Sn)	0.29	< 0.30	
Titanium	(Ti)	0.71	< 1.0	
Total Toxic Representation				

ESSENTIAL AND OTHER ELEMENTS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Calcium	(Ca)	920	125 - 370	
Magnesium	(Mg)	230	12 - 30	
Sodium	(Na)	64	20 - 200	
Potassium	(K)	31	12 - 200	
Copper	(Cu)	30	11 - 18	
Zinc	(Zn)	86	100 - 190	
Manganese	(Mn)	1.4	0.10 - 0.50	
Chromium	(Cr)	0.59	0.43 - 0.80	
Vanadium	(V)	0.28	0.030 - 0.10	
Molybdenum	(Mo)	0.15	0.050 - 0.13	
Boron	(B)	8.6	0.70 - 5.0	
Iodine	(I)	2.4	0.25 - 1.3	
Lithium	(Li)	0.045	0.007 - 0.020	
Phosphorus	(P)	200	150 - 220	
Selenium	(Se)	0.63	0.70 - 1.1	
Strontium	(Sr)	7.5	0.16 - 1.0	
Sulfur	(S)	46300	45500 - 53000	
Cobalt	(Co)	0.035	0.004 - 0.020	
Iron	(Fe)	19	7.0 - 16	
Germanium	(Ge)	0.034	0.030 - 0.040	
Rubidium	(Rb)	0.058	0.016 - 0.18	
Zirconium	(Zr)	0.61	0.040 - 1.0	

SPECIMEN DATA

COMMENTS:

Date Collected: 01/02/2022
Date Received: 01/10/2022
Date Completed: 01/11/2022
Methodology: ICP/MS

Sample Size: 0.197 g
Sample Type: Head
Hair Color:
Treatment:
Shampoo: Neutro

RATIOS

ELEMENTS	RATIOS	RANGE
Ca/Mg	4	4 - 30
Ca/P	4.6	0.8 - 8
Na/K	2.06	0.5 - 10
Zn/Cu	2.87	4 - 20
Zn/Cd	> 999	> 800

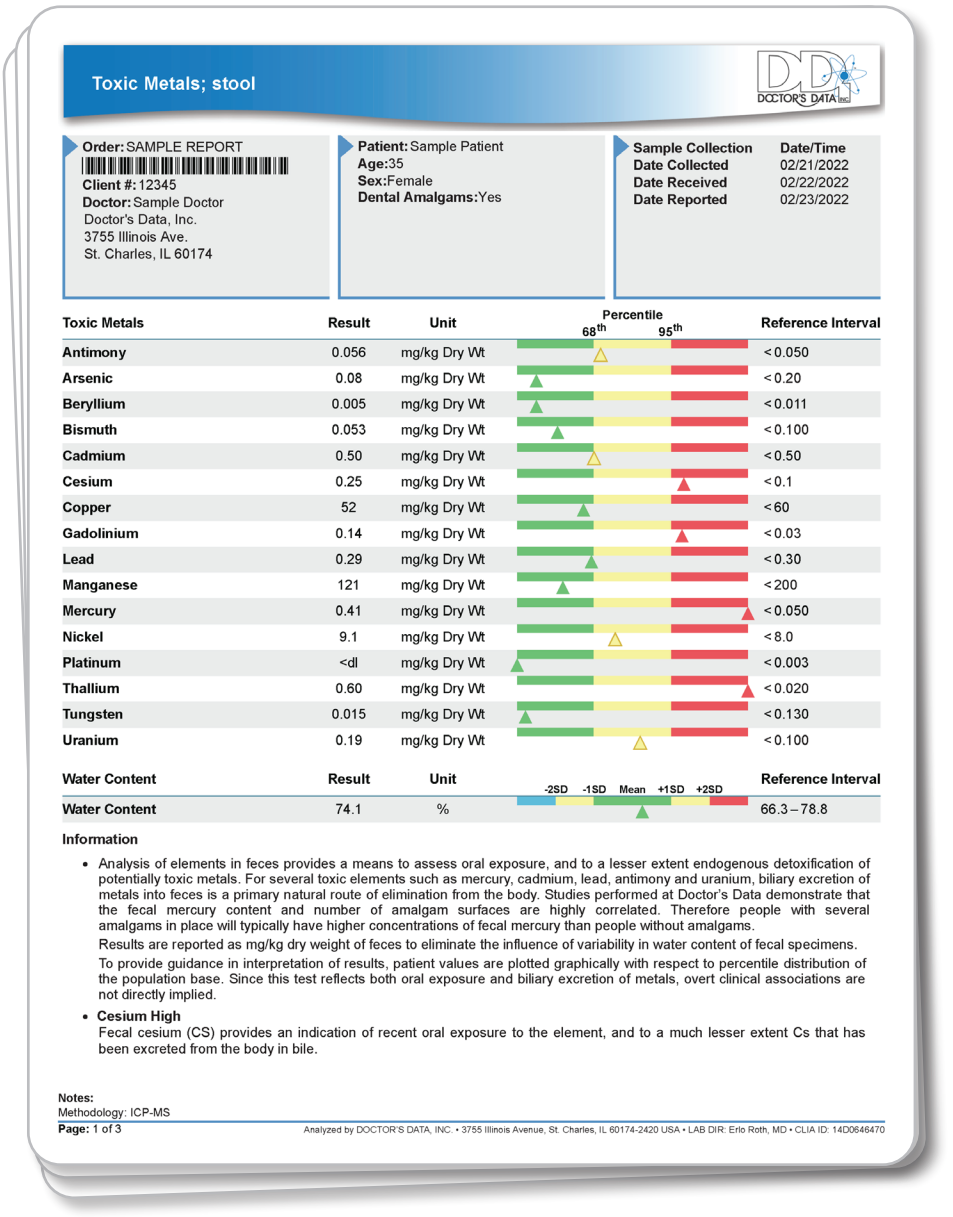
©DOCTOR'S DATA, INC. • ADDRESS: 3755 Illinois Avenue, St. Charles, IL 60174-2420 • CLIA ID NO: 14D0646470 • LAB DIR: Erlo Roth, MD

0001544

Stool Toxic Metals

Analysis of elements in stool provides a means to assess oral exposure, and to a lesser extent endogenous detoxification of potentially toxic metals. For several toxic elements such as mercury, cadmium, lead, antimony and uranium, biliary excretion of metals into feces is a primary natural route of elimination from the body. Specimen collection is convenient for the patient and only requires a single-step procedure. Elements are measured by ICP-MS and expressed on a dry weight basis to eliminate variability related to water content of the specimen.

Specimen collection is convenient for the patient and requires only a single-step procedure. Results are presented in a clear, easy-to-understand report and includes result-specific commentary.



Toxic Metals; stool

DOCTOR'S DATA

Order: SAMPLE REPORT
Client #: 12345
Doctor: Sample Doctor
Doctor's Data, Inc.
3755 Illinois Ave.
St. Charles, IL 60174

Patient: Sample Patient
Age: 35
Sex: Female
Dental Amalgams: Yes

Sample Collection	Date/Time
Date Collected	02/21/2022
Date Received	02/22/2022
Date Reported	02/23/2022

Toxic Metals	Result	Unit	Reference Interval
Antimony	0.056	mg/kg Dry Wt	< 0.050
Arsenic	0.08	mg/kg Dry Wt	< 0.20
Beryllium	0.005	mg/kg Dry Wt	< 0.011
Bismuth	0.053	mg/kg Dry Wt	< 0.100
Cadmium	0.50	mg/kg Dry Wt	< 0.50
Cesium	0.25	mg/kg Dry Wt	< 0.1
Copper	52	mg/kg Dry Wt	< 60
Gadolinium	0.14	mg/kg Dry Wt	< 0.03
Lead	0.29	mg/kg Dry Wt	< 0.30
Manganese	121	mg/kg Dry Wt	< 200
Mercury	0.41	mg/kg Dry Wt	< 0.050
Nickel	9.1	mg/kg Dry Wt	< 8.0
Platinum	<dl	mg/kg Dry Wt	< 0.003
Thallium	0.60	mg/kg Dry Wt	< 0.020
Tungsten	0.015	mg/kg Dry Wt	< 0.130
Uranium	0.19	mg/kg Dry Wt	< 0.100

Percentile: 68th, 95th

Water Content	Result	Unit	Reference Interval
Water Content	74.1	%	66.3 – 78.8

-2SD -1SD Mean +1SD +2SD

Information

- Analysis of elements in feces provides a means to assess oral exposure, and to a lesser extent endogenous detoxification of potentially toxic metals. For several toxic elements such as mercury, cadmium, lead, antimony and uranium, biliary excretion of metals into feces is a primary natural route of elimination from the body. Studies performed at Doctor's Data demonstrate that the fecal mercury content and number of amalgam surfaces are highly correlated. Therefore people with several amalgams in place will typically have higher concentrations of fecal mercury than people without amalgams.
  Results are reported as mg/kg dry weight of feces to eliminate the influence of variability in water content of fecal specimens.
  To provide guidance in interpretation of results, patient values are plotted graphically with respect to percentile distribution of the population base. Since this test reflects both oral exposure and biliary excretion of metals, overt clinical associations are not directly implied.
- **Cesium High**
  Fecal cesium (CS) provides an indication of recent oral exposure to the element, and to a much lesser extent Cs that has been excreted from the body in bile.

Notes:
Methodology: ICP-MS

Page: 1 of 3

Analyzed by DOCTOR'S DATA, INC. • 3755 Illinois Avenue, St. Charles, IL 60174-2420 USA • LAB DIR: Erlo Roth, MD • CLIA ID: 14D0646470

Implant Metals Profile

BLOOD

The Implant Metals Profile tests the circulating blood levels of the six metals most commonly associated with orthopedic and dental metal prostheses and implants.

Metal debris may be associated with excessive physical wear or corrosion of the metal alloys—the greatest release occurring from metal-on-metal (M/M) bearing surfaces. Many studies have shown that the released metal debris may be associated with localized tissue damage to bone and soft tissue, sensitivity reactions and remote adverse effects on normal physiological and biochemical processes. Reported blood metal levels should not be solely used to make conclusions regarding the integrity of metal prosthesis devices.

Dental implants have helped preserve the integrity of jaw bones and metal orthopedic implants have improved the quality of life for many people. It has proven to be a daunting task to develop very durable and biocompatible materials for these devices, and the released metal debris may cause very localized as well as systemic adverse effects. Many patients suffer from the consequences of released metal debris, but the onset of symptoms can be silent. Annual assessment implant metals levels, even in asymptomatic patients, can be useful for preventive purposes.

This profile requires only a single blood draw. Results are presented in a clear, easy-to-understand report and includes result-specific commentary.

DOCTOR'S DATA INC

LAB #: B000000-0000-0
PATIENT: Metal on Metal Hip
ID: P0000000000
SEX: Female
DOB: **AGE: 60**

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

Implant Metal Profile; whole blood

METALS					
		RESULT / UNIT ng/mL	REFERENCE INTERVAL	NO IMPLANT	EXPOSURE
Cobalt	(Co)	3.5	< 0.80		
Chromium	(Cr)	3.7	< 0.80		
Titanium	(Ti)	2.2	< 2.0		
Vanadium	(V)	0.09	< 0.50		
Molybdenum	(Mo)	0.95	< 3.0		
Nickel	(Ni)	2.8	< 3.0		

This test assesses the circulating blood levels of the six metals that are most commonly associated with orthopedic and dental metal prostheses or implants. Metal debris may be associated with excessive physical wear or corrosion of the metal alloys. The greatest release of the metals occurs when prostheses entail metal-on-metal (M/M) bearing surfaces. Many studies have shown that the released metal debris may be associated with localized tissue damage to bone and soft tissue, sensitivity reactions, and remote adverse effects on normal physiological and biochemical functions. The reported blood metal levels should not be solely used to make conclusions regarding the integrity of metals prosthesis devices.

Cobalt (Co, chromium (Cr), and molybdenum (Mo) These three metals constitute the most commonly used alloys that have been used in orthopedic prostheses such as hip, knee and shoulder replacements (about 60:30:7, respectively). The blood levels of Co and Cr, as well as deposition in remote tissues, will be elevated to some extent indefinitely in every patient who has had M/M hip replacement or femoral head resurfacing. Co is the most abundant metal released by wear from the bearing surfaces. The release of the metal debris is highly dependent on device design, surgical technique, level of physical activity and other factors that affect the health of involved bone and surrounding soft tissue. Very high blood levels of the metals are typically associated with failure of the prostheses; if symptoms are present referral to an orthopedist is warranted for further evaluation. Systemic adverse effects of the metals may be associated with excessive oxidative stress, inflammation, low levels of glutathione, compromised redox capacity, and detoxification (Phases I and II), and abnormal arterial permeability. Signs and symptoms of cobaltism include visual and auditory impairment, tinnitus, vertigo, impaired immune and renal function, cardiomyopathy, cognitive dysfunction/dementia, mood disorders, hypothyroidism, peripheral neuropathy and skin rashes, It should be noted that benign high blood Co levels may be associated with very high B-12 supplementation, and supplementation with trivalent Cr and Mo may contribute to high blood levels of the latter metals.

Titanium (Ti) vanadium (V) and nickel (Ni) Several grades of pure Ti and Ti-alloys have been used extensively for dental implants, and orthopedic devices such as plates, rods, screws, wires, and inter-bone stems. Although used because of their relative high biocompatibility, Ti and Ti-alloys are susceptible to various types of corrosion even when completely imbedded within bone; corrosion releases Ti and Ti-alloy metals. The released metals may be persistently high in circulation and accumulate in the immediate periprosthetic bone and soft tissue, as well as remote tissues and organs. Elevated blood Ti levels associated with prostheses are not necessarily associated with Toxicity. However; there is a dearth of clinical data regarding potential adverse health effects. The lack of clinical studies is disconcerting since it has been reported that serum Ti levels can be 18 times greater 10 years post-surgery than at baseline; the M/M hip prostheses in the subjects consisted of Ti-alloy acetabular sockets (bearing) and Ti femoral stems. In an animal model Ti released from within bone concentrated primarily in the spleen and lungs, and to a lesser extent in the heart, kidneys and liver. Ti may have adverse effects in blood, fibrotic tissues and osteogenic cells after transport through the circulatory or lymphatic systems. Blood levels of V, a minor component of some Ti alloys, are expected to be higher than normal (<1ng/mL) with Ti-alloy prostheses in good condition (1-2 ng/mL), and even higher with significant prosthesis wear (>5 mg/mL). A case report indicated V toxicity associated with a broken Ti alloy femoral stem and a blood V level of 5.8 ng/mL. The patient exhibited sensory-motor axonal neuropathy and bilateral sensorineural hearing loss, and did not have alloy bearing surfaces. It should be noted that isolated high blood levels of V may likely be associated with high supplementation with V. Nickel-containing Ti-alloys have been used primarily in dentistry. Much concern has been raised regarding the established cytotoxic, allergic and genotoxic activity of Ti-Ni alloys.

References available upon request.

SPECIMEN DATA

Comments:

Date Collected: 01/02/2022
Date Received: 01/03/2022
Date Reported: 01/04/2022

Time Collected: 07:30 am
Fasting: Yes

Methodology: ICP-MS

OUR MISSION:

To research, develop and offer innovative specialty tests that help doctors identify health risks and improve outcomes for patients with chronic conditions.

To educate and support healthcare professionals.

To improve lives through science.

DOCTOR'S DATA INC.

SCIENCE + INSIGHT

DOCTOR'S DATA, INC. 1972 50 years 2022 CELEBRATING 50 YEARS

3755 Illinois Avenue
St. Charles, IL 60174-2420

800.323.2784 (US AND CANADA)
0871.218.0052 (UK)
+1.630.377.8139 (GLOBAL)

doctorsdata.com

About Doctor's Data

Doctor's Data, Inc. has provided innovative specialty testing to healthcare practitioners around the world from our advanced, CLIA-licensed clinical laboratory since 1972.

A specialist and pioneer in essential and toxic elemental testing, the laboratory provides a wide array of functional testing to aid in decision making and better patient outcomes. Choose Doctor's Data to help you assess and treat heavy metal burden, nutritional deficiencies, gastrointestinal function, hormone status, cardiovascular risk, liver and metabolic abnormalities, and more.