MERCURY TRI-TEST

Quicksilver Scientific's CLIA-certified laboratory specializes in advanced mercury speciation testing, using the patented Mercury Tri-Test. This test utilizes samples of hair, blood, and urine to assess for the body's mercury burden and its ability to eliminate it. This test helps practitioners and patients to understand the magnitude and source of mercury exposure, as well as if additional support is needed in the process of mercury detoxification.

The Quicksilver Mercury Tri-Test is the only clinical test that utilizes mercury speciation analysis, a patented advanced technology that separates methyl mercury (MeHg) from inorganic mercury (HgII) and measures each directly. Quicksilver Scientific's instruments are sensitive enough to measure ambient mercury levels in the body WITHOUT THE NEED FOR CHALLENGE TESTING. This laboratory test provides unprecedented information for healthcare practitioners, allowing them to assess the patient's exposure sources, body burden and ability to excrete each form of mercury. This detailed information helps build an informed picture and allows the clinician to plan a rational approach to a successful detoxification strategy for the patient.

What about Mercury Challenge Testing?

In the 1990's, sensitivity of analytical equipment was not advanced enough to measure ambient (steady state) blood mercury levels. Therefore, "challenge" or "provocation" testing, using high doses of strong chelation agents, was developed to "pull" mercury out of organic cellular structure for urinary analysis under the diagnostic premise that it shows the mercury "body burden" of an individual and establishes correlation of long-term mercury burden. While mercury challenge testing was clinically relevant for the time, advances in technology and clinical study have proven challenge testing to be unreliable and even potentially damaging to the patient.

Why our Mercury Tri-Test is Better Than Challenge Testing:

1. Challenge Test does not differentiate between MeHg and Hgll. Only Total mercury level is represented (HgT).
2. Challenge does not reflect the "pool" of mercury premise.
3. There is no "non-challenged" reference range to compare the challenge test to; from a regulatory standpoint, there is an obvious potential for over-treatment.
4. Lack of standardization of challenge conditions:
    a. Challenge does not reflect long-term exposure as proven by clinical trial* reference p.120.

b. Challenge does not reflect long-term exposure as proven by clinical trial* reference.

    I. DMPS has a very different strength and specificity than DMSA.

    II. IV vs. oral administration has vastly different pharmacokinetics.

    III. Use of adjuncts such as EDTA, glutathione and glycine vastly changes the dynamics of the test and its output.

5. Challenge exposes individual to large dose of exogenous substance.
6. Challenge may cause redistribution of mercury into organs, including the brain.
7. Challenge does not measure ambient mercury burden.
8. Challenge does not elucidate elimination abilities of patient.
9. Challenge results are skewed in individuals with renal insufficiency (common in Hgll toxicity).

LAB #: U000000-0000-0
PATIENT: Sample Patient
ID: PATIENT-0-00001
SEX: Female
AGE: 61

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

Toxic Metals; Urine

TOXIC METALS		RESULT µg/g creat	REFERENCE INTERVAL
Aluminum	(Al)	210	< 35
Antimony	(Sb)	0.5	< 0.4
Arsenic	(As)	40	< 117
Barium	(Ba)	11	< 7
Beryllium	(Be)	< dl	< 1
Bismuth	(Bi)	0.2	< 15
Cadmium	(Cd)	2.2	< 1
Cesium	(Cs)	8.9	< 10
Gadolinium	(Gd)	0.4	< 0.4
Lead	(Pb)	31	< 2
Mercury	(Hg)	15	< 4
Nickel	(Ni)	22	< 12
Palladium	(Pd)	< dl	< 0.3
Platinum	(Pt)	< dl	< 1
Tellurium	(Te)	< dl	< 0.8
Thallium	(Tl)	0.4	< 0.5
Thorium	(Th)	< dl	< 0.03
Tin	(Sn)	1.9	< 10
Tungsten	(W)	1.2	< 0.4
Uranium	(U)	0.2	< 0.04

URINE CREATININE	RESULT mg/dL	REFERENCE INTERVAL
Creatinine	26.7	35– 225

SPECIMEN DATA

Comments:

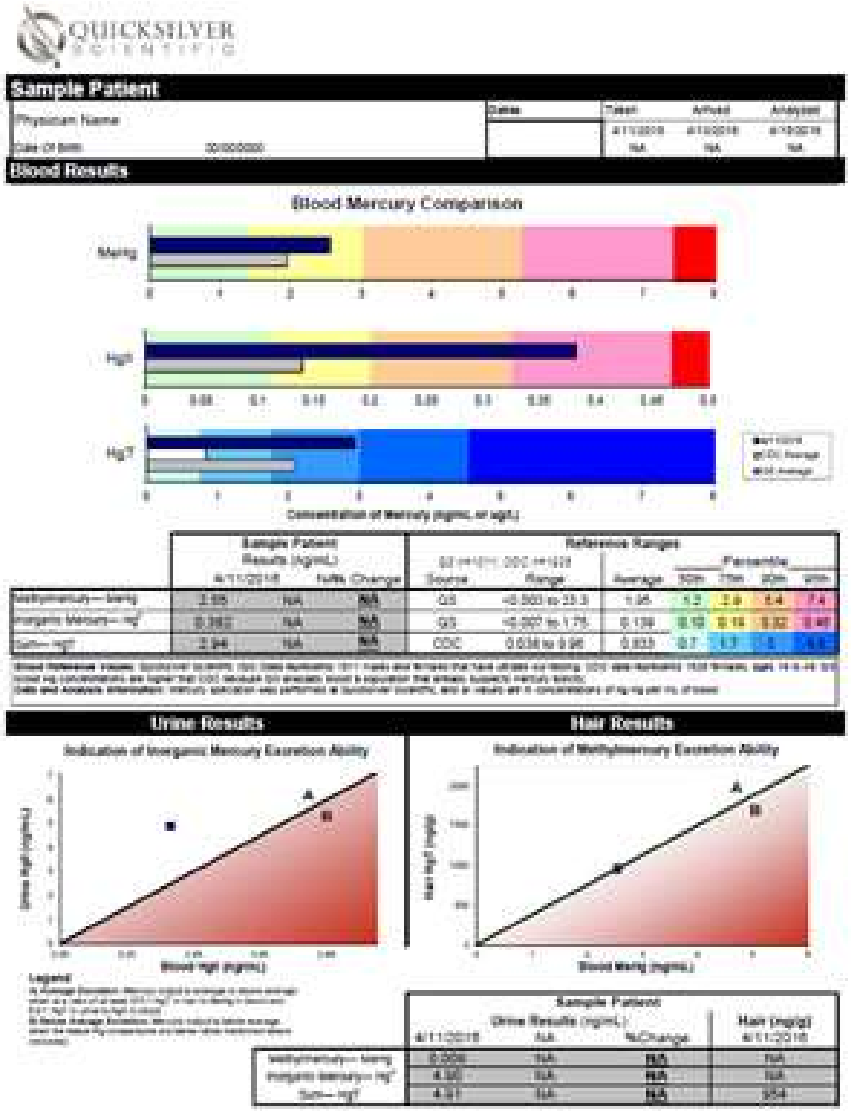
Date Collected: 5/14/2014 pH upon receipt: Acceptable Collection Period: timed: 6 hours
Date Received: 5/17/2014 <dl: less than detection limit Volume:
Date Completed: 5/19/2014 Provoking Agent: DMPS CAEDTA Provocation: POST PROVOCATIVE
Method: ICP-MS Creatinine by Jaffe Method

Results are creatinine corrected to account for urine dilution variations. **Reference intervals and corresponding graphs are representative of a healthy population under non-provoked conditions.** Chelation (provocation) agents can increase urinary excretion of metals/elements.

The Truth About Testing: Challenge Testing Vs. Mercury Speciation Testing

For over two decades now, many clinical metals toxicologists have been relying on “challenge tests,” also called provocation tests, to diagnose mercury and other metal toxicities.

The diagnostic premise of the testing is that it shows the “body burden” of the individual–that pool of deeply held metals that represents our lifetime accumulation of un-excreted metals.



The literature examining the challenge tests ranges from the years 1991 through 2001 and has thus far failed to find any evidence of the challenge tests revealing any more than recent exposures, and in some instances (Frumkin et al, 2001) failing to see exposures made clear by ambient testing.

Recently, challenge tests have come under fire from federal authorities as a diagnostic tool. The problem is not really that the challenge tests have no use (especially in the case of lead, where EDTA challenge testing is documented to have slightly better correlations with bone lead than do blood lead measurements, or the case of gadolinium where levels in blood and urine are undetectable without EDTA provocation). Instead, the problem is the way they are generally used and interpreted. There are many practitioners who use the data from challenge tests in scientifically and clinically valid ways, but in general use the challenge test has three main flaws:

1. The propagation of the myth of a special relevance of the pool identified by the challenge, i.e., "body burden," and the yes/no interpretation, i.e., "I found mercury in the patient."

2. The use of a non-challenged reference range to compare the challenge test to; this is probably the biggest problem from a regulatory standpoint since there is such obvious potential for over-treatment.

3. The lack of standardization of the challenge conditions:

- **DMPS has very different strength and specificity than DMSA.**
- **IV vs. oral administration has vastly different pharmacokinetics.**
- **Use of adjuncts such as EDTA, glutathione, and glycine vastly changes the dynamics of the test and its output.**

The measurement of mercury in the body and extrapolation to body burden and toxic conditions is a very complicated field, requiring acute clinical discernment, including integration of patient history, current exposures, symptomology, and effect of co-morbidities. The simplification and deification of the challenge test are no longer serving the evolution of the field of clinical metals toxicology. Now is the time for adoption of better tools!

At **Quicksilver Scientific**, we have developed advanced mercury test kits that:

1. Identify different sources of mercury by measuring the relative amounts of the two main forms of mercury in the body—methylmercury and inorganic mercury.

2. Quantify excretion capabilities for those two forms.

How the Mercury Tri-Test & Blood Metals Panel Differ

What are the two tests that Quicksilver offers, and how are they different?

The QS Mercury Tri-Test

Our patented speciation testing technology provides analysis for inorganic and methyl mercury, allowing specific data targeting for better defined solutions. Quicksilver Scientific's Mercury Tri-Test is the only clinical testing suite that utilizes blood, hair, and urine to measure excretion abilities and exposure to inorganic and methyl mercury.

Inorganic mercury (HgII) in the blood usually reflects a dental amalgam exposure, and urine is a route of excretion for it. Some is generated from the breakdown of methylmercury inside the body. Inorganic mercury is the most cytotoxic form of mercury and, therefore, an important pool to track. The urine:blood ratio gives an index of excretion efficiency for inorganic mercury.

Methylmercury (MeHg) mostly reflects seafood consumption, though some MeHg does form in the gut from swallowed amalgam-based mercury. Excretion of methylmercury is reflected in the hair. The hair:blood ratio gives an index of excretion efficiency of methylmercury.

The QS Blood Metals Panel

Quicksilver Scientific's Blood Metals Panel screens a broad range of nutrient and toxic metals to show elevated exposures to toxic metals or imbalances of nutrient metals in whole blood.

Nutrient Elements:

Nutrient Elements

Element	12-18-2015	NA	Range	Units	Percentile Rank by Quintile 20	40	60	80	100	Percentile
Calcium	4.67	NA	4.26-6.28	mg/dL						13%
Copper	79	NA	58-112	µg/dL						34%
Lithium	0.5 B	NA	<0.1-13.1	µg/L						35%
Magnesium	4.17	NA	2.72-4.05	mg/dL						98%
Manganese	6.2	NA	3.7-13.0	µg/L						22%
Molybdenum	0.3 B	NA	<0.2-1.3	µg/L						27%
Selenium	367	NA	88-339	µg/L						98%
Zinc	605	NA	378-725	µg/dL						70%

Potentially Toxic Elements

Element	12-18-2015	NA	Range	Units	Percentile Rank by Quintile 20	40	60	80	100	Percentile
Arsenic	2.2	NA	<4.7	µg/L						58%
Cadmium	1.3	NA	<0.8	µg/L						99.7%
Cobalt	0.2 B	NA	<0.6	µg/L						40%
Lead	1.06	NA	<2.10	µg/dL						44%
Mercury	5.0	NA	<5.8	µg/L						76%
Silver	< 0.1	NA	<1.0	µg/L						NA
Strontium	21	NA	<52	µg/L						39%

Calcium, Copper, Lithium, Magnesium, Manganese, Molybdenum, Selenium, Zinc

Potentially Toxic Elements:

Arsenic, Cadmium, Cobalt, Lead, Mercury, Silver, Strontium

Blood Metals Panel

Quicksilver Scientific's Blood Metals Panel screens for a broad range of potentially toxic and nutrient metals to show elevated exposure to toxic metals or imbalances of nutrient metals in whole blood. Results from this test can be used as a standalone screening, or to enhance information obtained from the Mercury Tri-Test. Because different protocols or support may be indicated to balance the other potentially toxic and nutrient elements in the blood, the most effective detoxification protocol can then be selected.

This whole blood elemental metals analysis uses state-of-the-art inductively coupled plasma/mass spectroscopy. The test measures levels for 15 metals, including beneficial nutrient metals and potentially toxic metals. Imbalanced mineral pairs, especially copper to zinc ratios, can often present clinically as heavy metal toxicity. Excess copper is also synergistically toxic with heavy metals, such as mercury, cadmium, arsenic and lead.

Although mercury is included among the metals assessed for in this test, it does not provide information about the different forms of mercury and the body's ability to excrete it as the Mercury Tri-Test does. The Blood Metals Panel only provides information about total mercury in the blood and does not differentiate between organic (methylmercury) and inorganic mercury.