

PORPHYRIN TESTING AT GREAT PLAINS LABORATORY

Porphyrin use to determine heavy metal toxicity in autism and other disorders in which heavy metal toxicity is suspected

Recently, there has been increasing excitement about a new biochemical marker that can be used to confirm mercury toxicity in both animals and humans. Dr. Woods, an environmental health scientist, reported that a unique porphyrin, called precoproporphyrin, could be used as an indicator of mercury toxicity. Chelation of rats exposed to mercury resulted in decreased tissue mercury concomitantly with decreased porphyrin excretion. Regression analyses demonstrated a high correlation (r approximately 0.9) between prechelation urinary porphyrins and postchelation urinary mercury levels and also between prechelation urinary porphyrins and prechelation kidney mercury concentrations. Similar results were found in dentists exposed to mercury.

Among dentists with no detectable urinary mercury, mean concentrations of urinary porphyrins were within the established normal ranges for male human subjects. In contrast, among dentists with urinary mercury in excess of 20 micrograms/L, mean urinary concentrations of four- and five-carboxyl porphyrins as well as of precoproporphyrin were elevated three to four times those of unexposed subjects.

Nataf reported that precoproporphyrin was also elevated in autistic disorder ($p < 0.001$) but not significantly in Asperger's. A subgroup with autistic disorder were treated with oral dimercaptosuccinic acid (DMSA) to remove heavy metals. Following DMSA treatment, there was a significant ($p = 0.002$) drop in urinary porphyrin excretion.

The porphyrin profile is an easy and useful screening tool for the possible presence of a porphyria (elevated porphyrins), either genetically produced or induced by environmental toxins, or a combination of both. Elevations in specific porphyrins on this profile indicate the need for follow-up with specific testing, for metals if toxic metal exposure is suspected, or other functional testing for severely affected individuals.

What are porphyrins?

Porphyrins are generated as the body builds hemoglobin, the compound that carries oxygen in blood cells. Porphyrin (from the Greek word for purple) is made up of four ring compounds joined together, a structure conducive to holding a metal ion in its center, iron in the heme porphyrin of hemoglobin and magnesium in chlorophyll. Small amounts of several porphyrins appear in urine normally. The relative amounts of each porphyrin are altered by certain hereditary diseases and by environmental or nutritional influences. The classic cases of hereditary porphyria displayed highly colored urine and skin eruptions and neurological symptoms of mania and "madness."

Difficulties in assessing body burden of toxic metals

There are difficulties with assessing toxic metals directly, although toxic and essential metals (minerals) are regularly measured in hair, blood, urine, and stool. The technology is now "robust", (i.e., reliable and accurate), but the precise physiological meaning of test results is often in doubt. Blood levels of metals may only be useful in detection of recent, "acute" exposure; as blood circulates metals are deposited in various tissues and bind very tightly. During tissue turnover, as the body tears down and rebuilds itself, small amounts of bound metals are released back into circulation. Sulfhydryl groups in hair protein have a strong affinity for toxic metals, whether from initial exposure or from recirculation; in fact, hair has been called an excretory organ. Measuring metals in hair is a good indication of previous exposure, but there are variations on how well individuals export metals from body tissues into hair. Fecal metals mainly indicate dietary intake, while urinary toxic metals are normally at very low levels unless a chelation agent is given, which may cause side effects.

Porphyrin profile assessment gives evidence of toxic exposure

When heme (hemoglobin) synthesis is disturbed, some porphyrin precursors to heme will build up inside the red blood cells, while other porphyrins are excreted in the urine and can be used as markers of genetic diseases or toxic exposures. The excess porphyrins in urine result from genetic deficiencies in several enzymes in the heme synthesis pathway(s), but can also be produced by inhibition of these same enzymes by toxins. The best studied at this point are lead and mercury. Porphyrin excretion patterns are useful for differential diagnosis of the hereditary diseases but also as indicators of toxic exposure. Porphyrin profiles can be used as biomarkers for past exposure to toxic metals, particularly to mercury, and to some xenobiotic compounds (environmental pollutants and certain drugs).

Porphyrins are analyzed by direct injection of stabilized and centrifuged urine into an HPLC (high pressure liquid chromatography) system with a fluorescence detector.

The resulting porphyrin profile aids in the diagnosis of particular genetic porphyrias or exposure to specific xenobiotic (foreign) compounds. Porphyrin testing is used, along with other testing, as well as the medical history and symptoms of the patient, to determine what the patient's condition may be and the possible source of the pathology.

"Porphyrin testing has become a critical part of the heavy metal assessment. The porphyrin profile gives direct measurement of the toxicity effect of heavy metals, such as lead and mercury. This is an invaluable tool because it helps to qualify that heavy metal toxicity is occurring - not just heavy metal exposure. I find that the porphyrin profile is essential for overall heavy metal assessment for my patients." - DAN! Physician

Our Testing Procedure

You can order our test kits, shipped free of charge, by telephone, Internet or FAX. Within 3 to 5 days, you will receive the test kits which come with complete shipping materials, sample requirements and instructions.

Follow the instructions to collect the sample; fill out the test request form; have this form signed by a medical practitioner; and send us the sample by express overnight courier (shipping cost is included in the price for U.S. clients only). [**Notes:** You need to indicate the method of payment or insurance information on the test requisition form. We are able to file for reimbursement from most insurance companies in the United States. Our laboratory is contracted with Blue Cross Blue Shield as an in-network laboratory as part of their national Blue Card member plan. We also submit insurance for Medicare and Tricare. Patients from other countries provide the payment up front and later can try to obtain the reimbursement from their insurance company.]

We will fax the results with explanations to your doctor and mail them to you within 3 to 4 weeks after receiving your samples. You can request a free phone consultation with our nutritional specialist after receiving the test results. Dr. William Shaw, our lab director, would be happy to consult with your doctor about the test results.

To request test kits or find more information, contact us at:

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References

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