Research pertinent to Hair Mineral Analysis
By
E.Blaurock-Busch PhD

A review of over 1400 articles indicate that hair analysis is the prefered method when analyzing for longterm heavy metal exposure and chronic nutritional deficiencies that are caused by inadequate intake and absorption problems. Scientists in the United States, Canada, Germany, Japan and Sweden have all shown that elemental concentrations in hair provide a relatively permanent record of exposure and that there is good correlation between concentrations in human hair and certain organs.

Researchers William Walsh and Ronald Isaacson have been studying the relationship between body chemistry and behavior for decades. They have published an impressive amount of data, including the relations between toxic elements and hyperactivity. They recognized that heavy metal exposure is higher in people prone to violent behavior and that a specific pattern of toxic exposure and mineral deficiencies is seen among death-row inmates. The researchers also noticed what they considered a "genius pattern," characterized by extraordinarily high levels of copper and sodium but low zinc levels in hair. Individuals with this type of hair mineral pattern are often highly intelligent and a bit eccentric, Walsh said. The scientists documented that hair mineral analysis is a valid test of body mineral concentration when used appropriately. "Hair is a diary of what is going on in your body," Isaacson said. After decades of studying chemicals in hair and associating mineral patterns with behavior, the researchers opened the HRI Pfeiffer Treatment Center seven years ago. It aims at treating biochemical problems, and a strand of hair often reveals the cause of psychiatric ailments that did not respond to other more conventional treatment.

Chattopadyay of Dalhousie University reported during the Second Human Hair Symposium in Atlanta, Georgia, that concentrations of lead in hair were lowest in rural population groups, higher in urban groups and highest in individuals who live close to lead smelters.

The author compared the toxic content of hair in American, German and Mexican children and found that concentrations were highest in Mexican children and lowest in German children.

Petering and a coworker at the University of Cincinnati College of Medicine have fed heavy metals to animals in measured quantities and monitored hair concentrations in an effort to correlate exposure with concentration.

Harry Shwachman of the Children's Hospital Medical Center in Boston along with Kopito of the Massachusetts Institute of Technology have shown that children with cystic fibrosis have as much as five times the normal concentration of sodium in their hair, but only about ten percent of the normal concentrations of tightly-bound calcium.

Shwachman and Kopito have also found low concentrations of sodium and potassium in the hair of patients with celiac disease (disorder in the digestion and utilization of fat) and that there is generally three to four times as much sodium and potassium in the hair of healthy individuals. This is in spite of the fact that the analysis of sodium and potassium in hair is not considered one of the stronger points of hair analysis, due to instrumentation limitations and difficulties with sample preparation.

Shwachman and Kopito also demonstrated that hair from victims of phenylketonuria (PKU) contains below-normal concentrations of magnesium and calcium; and that hair from victims of kwashiorkor, a severe protein-calorie malnutrition disease, has markedly increased concentrations of zinc.

Prasad of Wayne State University has shown that marginal zinc-deficiencies in the diet can be identified by below normal hair zinc concentrations.

Hambidge of the University of Colorado Medical Center has confirmed this work and suggested that the problem may exist because diets of people with low-income generally provide little zinc.

Hambidge has tested children in Denver's Head Start Program and found that both their hair and blood serum contain significantly lower concentrations of zinc than specimens from children of middle-income families. The researcher picked six children with the lowest hair zinc concentrations for further testing and found that taste perception was impaired in five. Zinc supplementation restored taste perception and increased zinc concentrations in both blood and hair.

Both Hambidge and Walter Mertz of the U.S. Department of Agriculture in Beltsville, Maryland, have individually demonstrated the below-normal hair concentrations of chromium in victims of juvenile onset diabetes.

Sheard and Carter of the Clinical Chemistry Division of the Center for Disease Control collected data from over 21,000 individuals and developed a standardization technique for measuring chromium in hair.

Gordus of the University of Michigan reported that the hair of students with high academic marks contained substantially more copper and less iodine, lead and cadmium than the hair of students with low marks.

Robert Pihl and colleagues of McGill University in Montreal, Canada, report that based on hair mineral results, they can distinguish with 98% accuracy normal children and those with learning disabilities.

Barlow of the University of Aston in Birmingham, England, and Kapel of the University of Leedss have observed a relationship between trace element profiles in hair and four different abnormalities. Hair mineral evaluations of three sets of identical twins revealed similar patterns even when one of the siblings lived in a different environment, suggesting that the metabolic pathways of minerals and trace elements are as similar as has been found with other diagnostic procedures.

Brain and hair tissues of Alzheimer patients have been found to contain substantially elevated aluminum concentrations and researchers at the National Institute of Health in Bethseda, Maryland, and at the Elizabeth Hospitals in Washington, D.C. noticed an improvement in symptoms after hair aluminum decreased.

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Current Research

Re: the validity of hair analysis by E.Blaurock-Busch PhD

On August 11, 1999, the Journal for American Medicine (JAMA) published the article ANDREW JACKSON'S EXPOSURE TO MERCURY AND LEAD POISONED PRESIDENT? Because in the past, biographers documented that this US President who lived from 1767 to 1845 had experienced typical symptoms of lead and mercury poisoning, it was suggested that he died from metal poisoning.

The medical researchers Ludwig M. Deppisch MD, Jose A Centeno PhD, David J Gemmel MA and Nora L Torres MS used hair analysis to prove or disprove the myth surrounding the death of

Andrew Jackson. Jackson's symptoms were compatible with plumbism and mercury poisoning, including excessive salivation, rapid tooth loss, colic, diarrhea, pallor, hand tremor, irritability, paranoia, violent mood swings, and chronic renal failure.

Hair samples of President Jackson, stemming from 1815 and 1839, were tested for lead and mercury by the Armed Forces Institute of Pathology in Washington, DC. Samples were tested in duplicate and results were compared with Jackson's medical history.

The following metal concentrations were found in Jackson's hair. Results are reported in PPM (part per million)

Sample Date:	Mercury	Normal Reference Range	TMI Ref.Range
1815 Sample 1	6.0	0.02-1.2	0-1.3
1815 Sample 2	6.0	0.02-1.2	
1839 Sample 1	*	0.02-1.2	
1839 Sample 2	5.8	0.02-1.2	

* sample was inadequate for analysis

Sample Date:	Lead	Normal Reference Range	TMI Ref.Range
1815 Sample 1	156	0.002-20	0-5
1815 Sample 2	105	0.002-20	
1839 Sample 1	68	0.002-20	
1839 Sample 2	70	0.002-20	

These elevated levels of mercury and lead in Jackson's tissue have been attributed to his prescription use of mercurous chloride and lead acetate. Jackson also had lead bullets in his left lung and shoulder, and these bullets were removed in 1832.

The researchers conclude that

the bullets in Jackson's body are the most likely cause of plumbism, because after they had been removed, his systemic lead levels declined. However, the authors do not see convincing evidence that Jackson developed peripheral neuropathy from his long-term lead exposure. TMI disagrees. Lead levels are over thirty times higher than our high reference ranges, and we have seen acute symptoms of plumbism in patients with much lower hair levels. While Jackson's lead levels declined after the removal of the bullets, the levels of 68 and 70ppm are still dangerously high and should be seen as a direct cause of chronic lead intoxication, causing symptomatic plumbism.

- Chronic systemic mercurialism was not a major factor in Jackson's declining health and death. The authors suggest that it might have been an insignificant factor in either his renal or his neuropsychiatric symptoms. *TMI disagrees again. While the levels of 5.8 ppm are not nearly as high as the lead levels, continuous exposure to mercurous chloride will seriously affect renal and peripheral function.*

While the authors' believe that Jackson's death was not due to heavy metal poisoning, we, at TMI, believe that his mercury and lead tissue levels had to seriously affect his health, *contributing* to his death.

We do thank the researchers for their important work. It documented the validity of hair mineral analysis. Once again, hair analysis is viewed as an important diagnostic tool.

The Dangers of Ingested Mercury (Hg) by E.Blaurock-Busch PhD

Just recently, the Director for Science in the Public Interest, based in Washington, DC. suggested that there is a higher level of mercury in tuna than that which is safe for children.

If and when a child ingests mercury-containing tuna regularly, blood levels won't rise until a tissue saturation has taken effect. Long before this tissue saturation takes place, such a child might experience speech and motor development delays, allergies, energy problems, learning

disabilities, digestive problems, tooth decay, emotional and severe psychiatric problems.

When we see elevated levels in a child's blood, the exposure has been severe and symptoms of toxicity are present. In other words, the child's mental and physical well-being is affected, sometimes severely and irrevocably.

As early as 1982, Dr. Martin Laker of the Royal Hospital for Sick Children in Bristol wrote in his Lancet article which accurately assessed the differences between hair, blood and urine analysis: "...in the future, when an assessment of body trace elements is needed, it might be wise to pause before rushing to take a blood sample. A specimen of hair might be more appropriate."

Hair tissue analysis reflects tissue levels, i.e. that which has been deposited in body tissues over time. If we would use this test on children at an early stage (or even regularly to truly PREVENT PROBLEMS), we could detect longterm exposures BEFORE blood levels have risen to the critical level, meaning we would PREVENT SERIOUS HEALTH PROBLEMS such as developmental delays, learning disabilities, emotional instabilities including violent behavior and other neurological disorders.

Just a few days after PARENTING MAGAZINE hit the shelves, a medical doctor’s wife brought in a hair sample of their 4-year old son who has severe speech delays and motor developmental problems. Because of apparent learning abilities, the boy had been admitted to a special school for the mentally disabled. While no medical or psychiatric tests or help had been spared in this child’s evaluation treatment, a hair mineral analysis had never been performed. Since the child had always been a fuzzy eater, his daily diet consisted of tuna fish sandwiches and huge amounts of soymilk. A subsequent hair mineral analysis showed very high mercury levels.

Biochemically, mercury compounds readily react with sulfhydryl groups in proteins and inhibit important enzyme activities. Both organic and inorganic mercury compounds are highly toxic to humans and animals, yet the present worldwide production of this toxic element is in excess of 10,000 tons per year and the toxic by-products of this heavy metal industry are a well documented danger to the environment. Frequent consumption of large fish such as tuna, shark or swordfish caught in contaminated waters can cause considerable mercury accumulation in tissue. It is a well known fact that insoluble mercury compounds in industrial waste are discharged into rivers and lakes, because it is incorrectly assumed that these compounds remain insoluble and thus non-toxic. In fact, it has been proven that soluble compounds which are absorbed by fish and plants enter the human food chain. Methyl mercury, a compound which is easily absorbed and deposited in the brain, causes CNS disorder and paralysis.

Research, source and clinical evidence:

Mercury destroys red blood cells and causes chromosomal damage and birth defects. As early as l976 Verschaeve demonstrated that people subjected to minute amounts of mercury suffered lymphocyte changes. A further study by Eggleston showed that repeated insertion and removal of amalgam fillings produces changes in T-lymphocytes. From these studies, it is clear that mercury influences the immune system.

In 1970 Caron demonstrated that minute amounts of inorganic and organic mercury cause lymphocyte changes, especially in patients with mercury allergies. In 1973 the North American Dermatologists Association reported, that up to 8% of the 1200 tested patients produced allergic reactions to mercury.

Therapeutic consideration

Detoxification procedures concentrate on sulfur amino acids such as lysine and methionine. In addition, vitamin B6 supports kidney function and assists in the excretion of toxins. Selenium, the biochemical antagonist to mercury, supports general tissue detoxification and reduces the body's ability to absorb mercury.

Chelation therapy with D-Penicillamin or DMPS eliminates mercury, but these types of treatment may be too harsh on children, especially those who display additional nutritional deficiency. These powerful chelation treatments easily force the elimination of important elements such as copper and zinc, potentially accentuation or even creating deficiencies. Oral chelation consisting of sulfur-containing amino acids such as methionine, antioxidants including selenium. For the synthesis of methionin, vitamin C, pyridoxin (vit.B6) and magnesium are necessary co-factors, preventing the formation of homocysteine which is an intermediate metabolite of methionine.

Laboratory analysis:

· Hair: Epidemiological studies show that HMA is a reliable test for assessing heavy metal toxicity and chronic exposure to mercury.

· Whole Blood, drawn in metal-free EDTA vacutainers, is used to confirm toxicity.

Mercury remains in the blood stream for approximately 24 hours and high levels are reliably detected.

· Urine: 24-hr sample or any urine sample collected spontaneously can be used to confirm mercury exposure. Mercury is excreted after it circulated in the blood stream for 24hrs. If the ability to excrete is reduced, the remaining mercury is deposited in body tissue.

Water: 0.002 PPM is the EPA suggested maximum level that is considered safe for human consumption

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