A Modern-day Mad Hatter

Dale Dunn, DC, LAc, and Timothy Fior, MD, DHt

Abstract: Mercury is ubiquitous in our environment. This has produced a "disease of modernity" which is a result of the gradual bioaccumulation of mercury from dental amalgams, vaccines and other medicines, cosmetics, foods, industrial and natural sources. Chronic mercury exposure can produce significant multi-system morbidity in susceptible humans, though diagnosis of chronic mercury intoxication remains controversial. This case depicts that of a "modern-day mad hatter" who, despite the use of well-indicated homeopathic medicines and careful attention to homeopathic case management, failed to progress to cure. The eventual diagnosis of chronic mercury toxicity and subsequent oral chelation therapy helped to significantly improve some chronic neurologic symptoms which were only temporarily palliated by a series of well chosen homeopathic remedies. Homeopaths are reminded that any/all exciting and maintaining cause(s) of disease are impediments that must be accurately ascertained and removed before homeopathic cure is possible.

Key words: Mercury, Mercury toxicity, Impediment to cure, Causa occasionalis

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Introduction and Background

Mercury poisoning is not a new phenomenon with reports dating back to ancient China implying that the first emperor, Qin Shi Huangdi, 259 BC-210 BC, was inadvertently poisoned by his physicians using mercury compounds, ironically in order to provide him immortality. (1) Today, chronic mercury toxicity is more common than acute poisoning. Its effects can be dermal, neurologic, psychological, endocrine, gastrointestinal, cardiovascular or renal. Toxicity results from the gradual bioaccumulation of mercury via inhalation, ingestion, injection and/or absorption through the skin.

The term *mad hatter* first entered the common vernacular of 19th-century Europe as a result of observations and reports on the systemic effects of chronic mercury exposure in workers employed in the hat-making industry. For these workers, called "furriers", "felters" and "hatters", contact with dust or steam vapor containing the elemental or nitrate form of mercury was unavoidable, making them an ideal population for observations and case studies related to mercury morbidity and early discussions about employer liability. (2, 3)

In the U.S., throughout the 18th Century, though even then controversial, it was standard-of-care for large doses of calomel (mercurous-chloride, Hg_2CL_2) to be employed by physicians. Once patients salivated (a sign of mercury poisoning) they were considered to have had a "curative" dose of mercury. The prominent physician Benjamin Rush championed mercury as the "Samson of medicine," in his defense of its use during Philadelphia's yellow fever epidemic of 1793-94, to which critic William Cobbett replied, "Dr. Rush, in the emphatic style peculiar to himself, calls mercury the Samson of medicine. In his hands and those of his partisans it may indeed be justly compared to Samson: for I verily believe they have slain more Americans with it than ever Samson slew of the Philistines..." (4) Williston, in the late 19th century, reported the impact of mercury pollution from industrial waste on communities around Connecticut (5) and Wilson, in his 1940 textbook on neurology, attributed impairments such as inattention, irritable-excitement, hallucinations and rapid, oscillatory tremors (hatter's shakes) to mercury poisoning. (6) In 1946, Buckell describes "erethrism" (insomnia, extreme shyness and withdrawal, memory loss, emotional instability, irritability at trifles, depression, anorexia, vasomotor disturbance, uncontrolled perspiration, and blushing) as the first symptom-complex to develop. (7) Worldwide, during the first half of the 20th century, "Pink Disease" (acrodynia) was a common infant morbidity and sometimes mortality caused by calomel-laced teething powders. Affected babies presented with erythema of the palms and soles, edema of the hands and feet, desquamating rash, hair loss, pruritus, diaphoresis, tachycardia, hypertension, photophobia, severe irritability, anorexia, insomnia, poor muscle tone, and constipation or diarrhea. (8-11) In 1961, researchers correlated elevated urinary mercury levels with the mysterious symptoms of tremors, sensory loss, ataxia, and visual field constriction that occurred in a population of fishermen and their families in coastal villages surrounding Minamata Bay. (12)

Today, signs and symptoms of chronic mercury toxicity develop insidiously, are nonspecific and varied. The toxic person may experience anorexia, weight loss, fatigue, and muscular weakness, (13) all of which may indicate a number of diseases. As a result, mercury toxicity is under-appreciated as a potential source of chronic morbidity in humans. Today's mad hatter syndrome, mercury toxicity (14), has been linked to "constellation syndromes" constituting immune, mental-emotional, cardiovascular, visual-aural, neurological, fertility, musculoskeletal and

endocrine disorders. (15-21) Atopic dermatitis has been described (22) and links between mercury toxicity, Alzheimer's (23), autism (24), and Amyotrophic Lateral Sclerosis (25) have been suggested.

Mechanisms of Mercury Poisoning

Mercury in all forms can poison and according to some, it does so in amounts significantly less than previously believed. (26) Damage is ascribed to mercury's ability to induce oxidative stress (27) and its affinity for the body's ubiquitous sulfhydryl (thiol), seleno-hydryl, phosphoryl, carboxyl, amide and amine groups that are intimately involved with enzymatic processes. (28) Oxidative damage interferes with mitochondrial DNA replication (clastogenesis) and the proteins required for membrane stability, transport and cell structure. Consequently**,** mercury has the potential to disrupt and/or destroy the structure and/or function of any organ or sub-cellular mechanism by depletion of glutathione and protein-bound sulfhydryl groups, resulting in the production of reactive oxygen species such as superoxide ions, hydrogen peroxides, and hydroxyl radicals. As a consequence, enhanced lipid peroxidation, DNA damage, altered calcium and sulfhydryl homeostasis occurs. (29) The vapor from amalgam fillings contains elemental mercury (Hg_0) which is lipid soluble, allowing ready entry into the blood, then across diffusion barriers such as the blood brain barrier. Once past the blood brain barrier, mercury is readily oxidized into mercurous (Hg+) and mercuric (Hg++) ions. Due to their charges, these ions cannot easily recross the blood brain barrier, resulting in brain and CNS bioaccumulation. (30) Methyl-mercury, primarily from fish, forms the compound methyl-mercuric-L-cysteine, a molecular mimicker of methionine. In this form, methyl-mercury may penetrate the blood-brain, pulmonary and gastro-intestinal barriers unopposed, using its affinity for the L-type amino acid (cysteine) transport system. Brain levels of mercury are not directly measurable except at autopsy. Sugita (1978) has presented autopsy evidence that brain-mercury concentrations increase with age, and has derived, via regression analysis, a biological halftime of 18 years (6570 days) in the brain. (31) Some working in this field suggest that the actual halftime of mercury in the brain/CNS may be even longer, leading to essentially continuous accumulation throughout life. (32) As there is no innate mechanism in the body to remove this mercury from the brain, it is doubtful that homeopathic remedies could be of assistance. The same author asserts that only prolonged, gradual, low dose oral chelation with a lipid soluble dithiol chelator for mercury like alpha lipoic acid (ALA) can gradually remove this mercury from the brain based on observed symptomatic clinical improvements in neurologic symptoms using ALA this way. (38)

Diagnostic Markers for Mercury Toxicity

Whole Blood/Serum mercury levels reveal recent exposures, reflecting primarily dietary influences (methyl-mercury). Once ingested, methyl-mercury is rapidly absorbed into the bloodstream where it resides only briefly before being distributed throughout the body, typically shunted into fatty tissues. Therefore, blood testing is rarely useful in patients with symptoms implying chronic mercury intoxication, especially from amalgam fillings.

Urine analysis of total mercury typically reflects combined sources of inorganic mercury, either de-methylated from foods or elemental from dental amalgams. However, total-load from urine cannot determine tissue retention such as in the brain or the kidneys. As a result, the potential for underestimating the amounts of mercury retained in the tissues is significant.

Urine porphyrins, as more precise markers, can identify chronic mercury toxicity as mercury down-regulates two critical enzymes, uroporphyrinogen decarboxylase (UROD) and coproporphyrinogen oxidase (CPOX), both involved with synthesis of heme. This down-regulation, (Figure 1) particularly in the renal cortex, results in the accumulation of 5-carboxyporphyrin (5cxP), precoproporphyrin and coproporphyrin in the urine; interpreted as an elevated body-burden of mercury. (33) Although highly specific for chronic mercury poisoning, urine porphyrins have a low sensitivity as they are easily destroyed by heat, or motion, thus the risk of false negatives is high.

C**helator-challenge** utilizes DMSA or DMPS**.** (34, 35) Following an oral dose, an 8-24 hour urine collection is examined for heavy metals. However, there are drawbacks:

1.The large amount of chelator required may provoke mercury redistribution symptoms if the patient is already metal-burdened. Adverse drug reactions to the chelator are possible and it is unclear what effect chelators and adjuvants may have on a patient's existent symptoms. For example, the side-effects of DMSA include GI disorders, skin rashes and flu-like symptoms and according to some researchers, the simultaneous administration of adjuvants such as N-Acetyl-Cysteine (NAC), glutathione (GSH) or selenium may actually harm the patient. Mild to moderate neutropenia has been reported in some patients and regular complete blood counts are recommended during therapy. (36) In addition, renal and hepatic function should be checked before starting treatment. (37) Anecdotal reports of chelator in saliva, having the potential to dissolve existing amalgam surfaces, has led some clinicians to the conclusion that any amalgam in a patient's mouth, even under crowns is a staunch contraindication for chelator-challenge testing and/or chelation therapy until any/all oral mercury is removed. (38, 39)

2. Challenge testing is non-specific and if heavy metals show up in the urine, which ones and in what order they appear is unpredictable. For example, early on, the patient in this case report orally loaded 100mg of DMSA as a urine-chelator, followed by an 8-hour urine collection. The results demonstrated elevated urine levels of lead, but no detectable levels of mercury, despite the high index of suspicion for chronic mercury toxicity.
3. Some recommend both pre- and post-challenge urine collections that are examined and compared in order to determine both current exposure (pre-) and total body burden (post-). (40, 41)

Hair Element Analysis (HEA) can be helpful, primarily by demonstrating chronic intoxication. HEA represents accumulated/distributed methylmercury (MeHg); usually >80% (42, 43) and MeHg is taken up by both hair follicles and brain cells and stored as MeHg-cysteine complexes. As a result, epidemiological studies often use total mercury concentrations in hair as biomarkers for MeHg exposure from fish consumption. Total mercury concentration in hair however, does not reflect exposure from inorganic mercury, as for example from the mercury vapor of amalgam fillings. (42) This is true in the case that follows, which despite a high index of suspicion of chronic intoxication from inorganic mercury from amalgam fillings, the hair mercury levels are low. This occurs because mercury causes derangement of mineral transport, which impairs the ability to excrete heavy metals. Mercury is the only heavy metal known to cause deranged mineral transport. Cutler has developed five statistical counting rules for the essential elements in hair analysis. If any one of the five counting-rules is positive, then deranged mineral transport is present, and chronic mercury intoxication is inferred. When deranged mineral transport is present, the toxic element analysis becomes unreliable until effective chelation therapy has concluded. (38, 44)

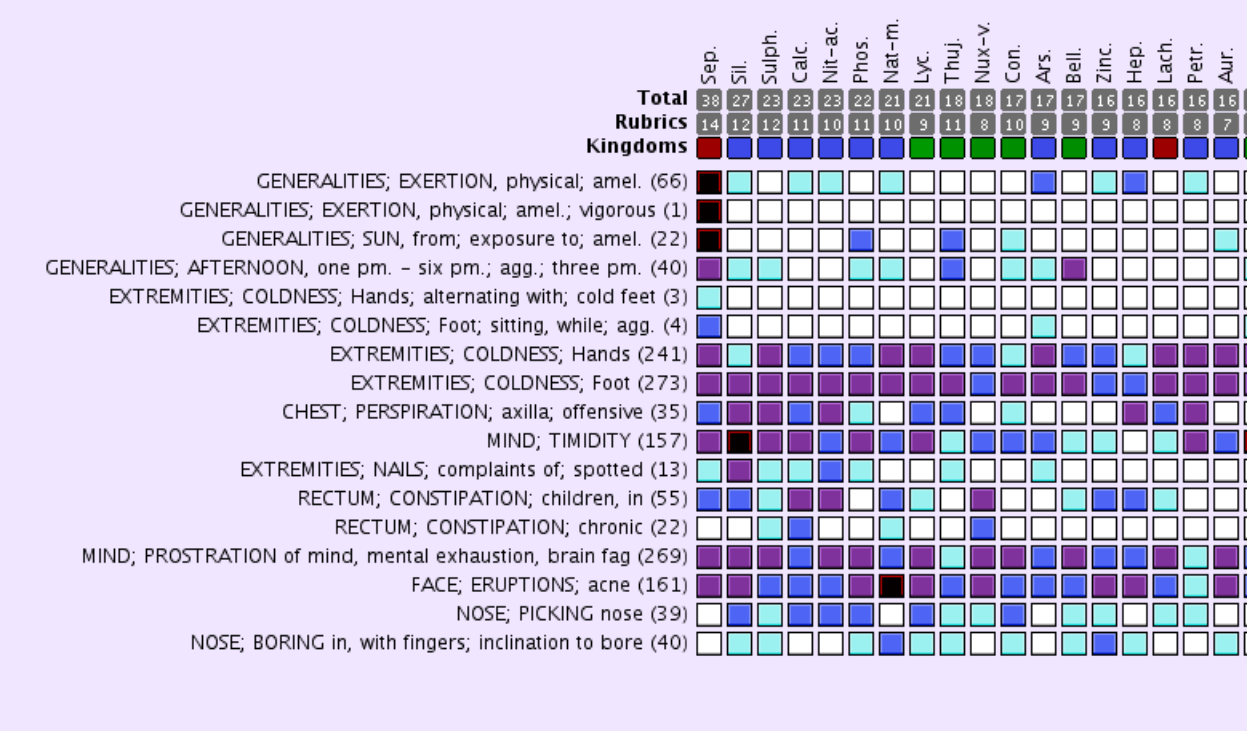
This case report illustrates chronic mercury intoxication as an impediment to homeopathic cure. Despite careful prescribing by an expert homeopath, a series of well-indicated homeopathic medicines merely palliated some chronic neurologic symptoms.

Case

A 45 y.o. male presents for homeopathic consultation with the following complaints:
Chronic constipation, since amalgam fillings were placed in childhood.
Brain fog. (Brain fog is a distinctive cognitive symptom which is highly characteristic of chronic mercury intoxication. It consists of being unable to think clearly without great effort. (38))
Timidity and intermittent irritability which began soon after amalgam placement.
Psoriasis on both elbows.
Arthritic pains in various joints.
Chilliness, especially cold hands and feet, worse at rest.
Offensive perspiration in the axillae.
White spots on most fingernails.
Chronic facial acne.
Habitually picks his nose.
Intermittent depression.
Recurrent sore throat pains.
Recurrent bronchitis.
The patient's mood, energy and arthritis pain are improved in the sun and while exercising (running).
Energy declines at 3pm.

Initial Case Analysis

A repertorization of the initial case shown below, with the more characteristic symptoms at the top, reveals Sepia to be a well indicated remedy.



Course of Care

Initially, the patient improved with *Sepia* 200D (Dunham preparation), slowly increasing to MM + 3H over the course of several years. Many other homeopathic medicines such as *Sulphur* taken to MMM, *Phosphorus* up to CM and *Silica* to MM were successfully prescribed as acute and/or chronic signs/symptoms became manifest. These and other homeopathic medicines served to improve the patient's mood and energy. Unfortunately, the patient would relapse into severe brain fog, intermittent irritability, depression and despair on a regular basis. Subsequently, due to lack of more permanent changes with homeopathic treatment, the patient elected to undergo a dental amalgam removal-replacement process. During the course of approximately 1.5 years, seven amalgams each containing approximately 50% mercury were removed and replaced with composite fillings. (Some patients feel better after amalgam removal as noted by Hal Huggins, D.D.S. and others. However, some may be worse, which is likely those who are genetically predisposed to having a difficult time excreting mercury.)

During and after the amalgam-removal-replacement process, the patient developed new symptoms that included wandering-intermittent, then constant fasciculation of both calf muscles, worse after exertion. His brain fog, irritability and depression worsened despite the use of well-indicated homeopathic medicines and the amalgam removal-replacement process.. A DDI (Doctor's Data Incorporated, St. Charles, IL) Hair Element Analysis was performed (Table 1) and interpreted. (38, 44) Using Dr. Cutler's "5 Counting Rules" protocol, it was determined that the results met the Counting Rule #1 (the "all low" pattern where only five or less essential elements are to the right of the midline) indicating that deranged mineral transport was present. Since mercury is the only heavy metal which causes deranged mineral transport, this was evidence of chronic mercury intoxication. Furthermore, a symptom checklist indicated a 99.9% probability of chronic mercury intoxication.

Subsequently, the patient began low-dose oral chelation therapy according to Cutler's protocol, beginning with 6 mg. of ALA (Alpha-Lipoic Acid) every 3-4 hours for 3 days and 2 nights per week. The dose was titrated upward per the patient's tolerance, after which DMSA (Di-Mercapto-Succinic Acid) was added until doses of 50 mg. of DMSA and ALA were well-tolerated. Other supplements and antioxidants were taken at intervals to deal with symptoms of chelation therapy and the detoxification process.

During the course of approximately two years, the patient's brain fog and calf fasciculations significantly decreased and his energy and sense of well-being increased. (Although homeopathic remedies had palliated the brain fog and calf fasciculations, chelation produced a more permanent and marked improvement in these symptoms. This

correlates with the hypothesis that since there is no natural mechanism to remove mercury from the brain/CNS, homeopathy cannot enhance this process. Thus chelation with a lipid soluble chelator like ALA may be one of the only known ways to remove this mercury from the brain as evidenced by its ability to improve these chronic neurologic symptoms.) The most remarkable mood change was the decrease of his marked restlessness and nervous irritability. He also became less withdrawn and shy. A follow-on DDI-Hair Element Analysis was performed approximately two years after the start of oral chelation therapy, and almost six years after the start of care, yielding the results shown in Table 2, interpreted as "normal" per Cutler's "5 counting rules" and coincident with the patient's clinical improvement. This result is consistent with paragraph 7a in the *Organon* where Hahnemann states that we should remove the causa occasionalis or inciting cause of the symptoms whenever possible. Throughout the chelation process, the patient continued to receive and be helped by well indicated homeopathic single remedies.

Mercury in Homeopathic Medicine

In 1796, Dr. Samuel Hahnemann introduced "the uninterrupted, primary action of (highly-dilute) mercury" in his "Essay on a New Principle for Ascertaining the Curative Power of Drugs."(45) By 1798, Dr. Hahnemann describes mercury as possessing homeopathic potential and finally, mercury appears as a fully-proven homeopathic medicine in Volume 1 (1810-11) of Hahnemann's Materia Medica Pura. (46) From the Organon of Medicine; Hahnemann's exhortation to remove the occasional (causa occasionalis), temporary or maintaining cause(s) whether internal or external is stated. In aphorism7a he notes that any intelligent physician would ascertain that a patient who presents with episodes of syncope and emotional lability may be suffering from exposure to an exciting cause such as strong smelling flowers. A patient who presents with a chronic eye inflammation would have his eye examined for a foreign body and that flank or bladder pain requires the examination for and possible expulsion of a causative "calculus". Dr. Hahnemann also expounds upon his experience with and warnings about mercury poisoning caused by allopathic dosing in aphorism 41, 41a, 74 and 276b. In these aphorisms, Hahnemann deplores allopathic doses of mercury, describing them as creators of "monstrous, complex and dis-similar" disease states, whose only service is to "weaken the vital force" and "destroy the organism." (47)

For homeopathic physicians, the proving symptoms of *Mercurius solubilis or vivus* (46) highlight the protean manifestations of acute and/or chronic mercury poisoning. Ultra-dilutions of homeopathic mercury, as with gross intoxication, affect every system of the body. The clinical signs and symptoms of chronic mercury toxicity seem remarkably similar to the provings and therefore striking to the homeopathic physician, while vague and unrelated to the allopathic physician. Clinically, mercury-intoxicated patients will exhibit significant improvements, remissions and dramatic relapses despite the use of well-indicated homeopathic medicines, prescription medications or functional medicine protocols. The length and intensity of the relapses typically increase and the patient may become quite physically, mentally and emotionally disabled as did the patient in this case report. These are the patients who initially react positively to well-chosen homeopathic medicines as superficial manifestations of disease are resolved. Nevertheless, these patients typically require repetition of the same homeopathic medicines in ascending, descending and/or LM potencies more frequently, simply to remain in a precipitously-stable state, while the deeper-lying disease (miasmatic according to some) remains refractory to care. Eventually, regardless of posology, stability is lost and frequent, prolonged relapses occur. Other patients with seemingly-similar patterns may recover quickly, even permanently, but mercury-intoxicated patients demonstrate bi-phasic pathology, causing the homeopathic physician to reach the conclusion that something is being overlooked. Often, the entire case is re-taken and the homeopathic physician is confronted with the same well-indicated medicines. As mercury accumulates in the brain-CNS complex, neurologic and/or mental-emotional aberrations may begin to dominate. Proving symptoms include an insidious-onset of depression with a loss of motivation and lack of interest in one's surroundings and life; a type of existential boredom (ennui) along with anhedonia; increasing fears, anxiety/panic with heart palpitations and dyspnea. Feelings of hopelessness with a sense of impending doom spawn an inability to solve the smallest of problems. There may be a combination of extreme irritability with amplified timidity in social settings. The patient may engage in prolonged, agitated, loquacious and repetitive conversations followed by an abrupt withdrawal from society and/or family for long periods of time. The patient may become quite restless, emotionally labile and exhibit routinely-poor judgment. Uni-polar euphoria and/or manic-depressive behavior may

develop. Obsessive-compulsive behavior may be seen as neuro-intoxication progresses. Delusions and hallucinations are possible in severe cases.

Conclusion and Discussion

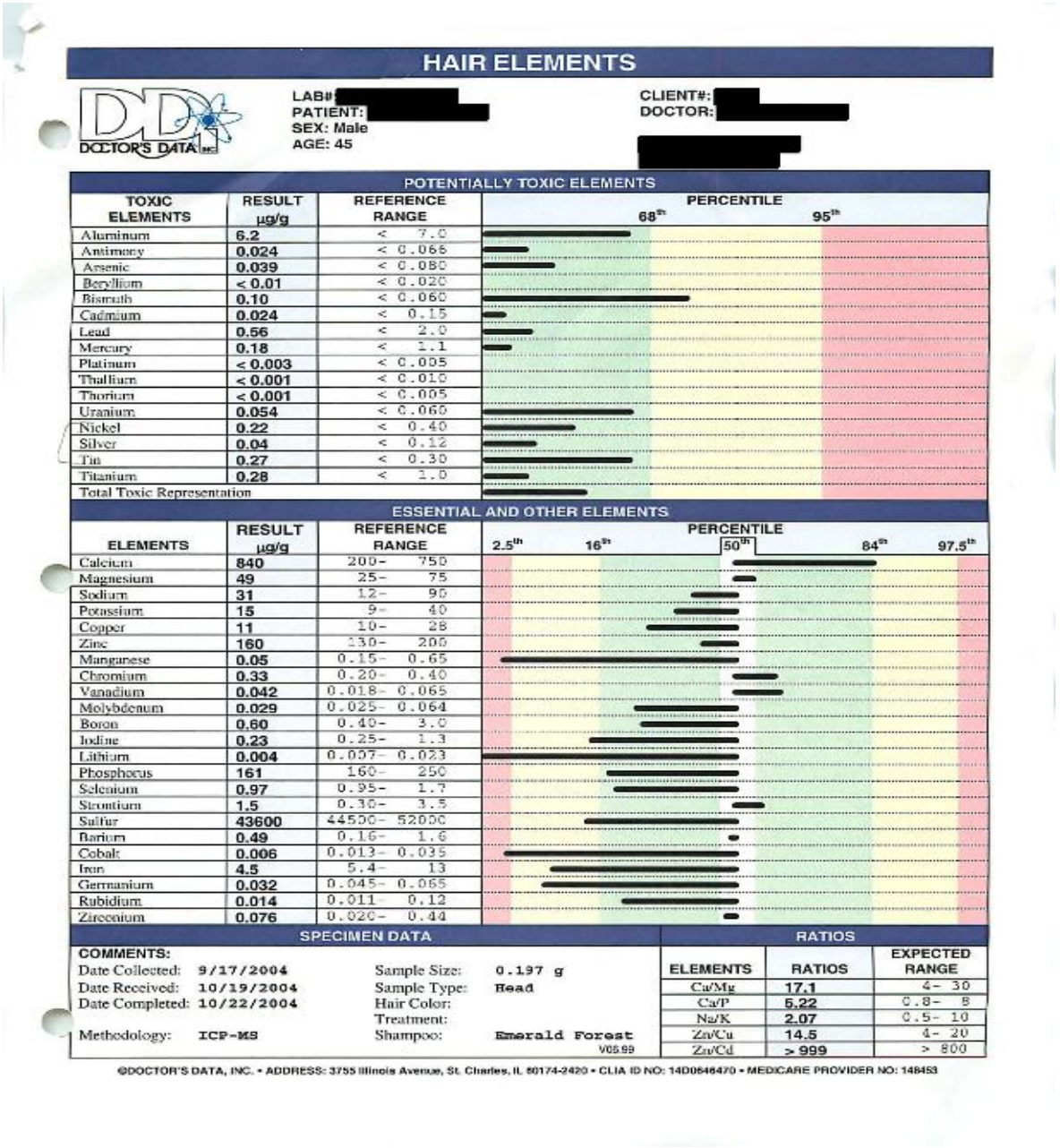
Mercury toxicity poses serious risks to human health, having become a significant, yet controversial clinical entity. Its ubiquity in the environment via agricultural, manufacturing, medical, dental and food sources creates a potentially-toxic "total-load" effect in susceptible individuals. Signs and symptoms are diverse, reflecting direct cellular and mitochondrial damage, enzymatic pathway disruption and/or indirect damage as a result of oxidative stress. Effects are primarily noted in the nervous, genitourinary, respiratory, dermal, gastrointestinal, cardiovascular, psychological and aural-visual systems, with the most devastating effects seen in the nervous system. Toxic effects of mercury exposure have been catalogued throughout the centuries, primarily through documentation of acute poisonings. Chronic mercury exposure, owing to its often multi-system effects, vague signs and symptoms, has been less stringently studied and reported. As a result, suffering individuals may find themselves in a diagnostic and treatment void. In order to fill this void, unique diagnostic, testing, interpretive and treatment protocols have been developed.

The patient in this case report had been under expert homeopathic medical care, utilizing well-indicated homeopathic medicines with precise attention to posology and the peculiarities of the original case and subsequent follow-ups. Despite initial encouraging and significant improvements in the patient's condition while under homeopathic medical care, the patient experienced cyclic regressions and relapses, especially of more neurologically based symptoms of fasciculations and mood. Subsequently, the patient fell into a population of patients who feel bereft of diagnostic and therapeutic options. It is a frustrating case like this, the result of the complex layering of morbidity imposed by modernity that exhorts homeopathic physicians to recall and heed Hahnemann's experiences with "hygiene", "impediments to cure" and "causa occasionalis". Eventually, this case yielded to unique protocols developed to diagnose and treat mercury toxicity. Clinical improvement, consistent with the predictive outcome as outlined by the protocol, was obtained. As a result, this case study, rather than highlighting a homeopathic medical cure, serves instead as a strong reminder of Hahnemann's aphorisms. When confronted with modern-day mad hatters or other confounding, and complex cases that remain refractory to homeopathic best-practices, the physician must begin searching for accumulated and/or repetitive exposures to the myriad of obvious or occult chemical, physical, mental and emotional stressors unique to our modern times. Hahnemann reminds us that the case well-taken using classical protocol, prescribing well-indicated medicines while employing assiduous posology, does not necessarily end with a homeopathic medical cure if maintaining causes are ignored. Indeed, this case report demonstrates this principle. For this patient, the bioaccumulation of mercury due to chronic exposure plus a specific sensitivity to mercury proved to be the impediment to a lasting homeopathic medical cure. The removal of this underlying impediment and maintaining cause ultimately provided the patient with a continued significant improvement.

Table 1

The patient's post-amalgam removal Hair Element results. In the "essential and other" elements section, according to Cutler's "counting rules" protocol, only five elements extend to the right of the midline. Thus, Counting Rule #1 is positive, qualifying this patient as having deranged mineral transport. Since mercury is the only heavy metal which causes deranged mineral transport (pregnancy and lactation are other known causes), this results confirms chronic mercury toxicity. Interestingly, none of the potentially-toxic elements are elevated into the red (toxic) range. However, this is not unusual when there is deranged mineral transport, as the excretion of toxic elements including mercury are blocked by chronic mercury poisoning. Also, note that Ca+ and Mg+ are to the right of midline, Na+ and K+ are to the left and Lithium is low, all interpreted as characteristic of mercury toxicity. (44) During the intervening six years, the patient experienced improvements and regressions while using well-indicated homeopathic medicines. However, significant, stable and permanent wellness was never achieved with homeopathic medicines until the patient underwent oral frequent low-dose chelation therapy.

Note: These counting rules are unique and apply exclusively to the DDI (Doctor's Data Incorporated) Hair Element Analysis test used in this case report. Cutler describes how these rules may be adapted to results from other reference laboratories. (44)



HAIR ELEMENTS

DOCTOR'S DATA

LAB#: [redacted]
PATIENT: [redacted]
SEX: Male
AGE: 45

CLIENT#: [redacted]
DOCTOR: [redacted]

POTENTIALLY TOXIC ELEMENTS

TOXIC ELEMENTS	RESULT µg/g	REFERENCE RANGE
Aluminum	6.2	< 7.0
Antimony	0.024	< 0.066
Arsenic	0.039	< 0.080
Beryllium	< 0.01	< 0.020
Bismuth	0.10	< 0.060
Cadmium	0.024	< 0.15
Lead	0.56	< 2.0
Mercury	0.18	< 1.1
Platinum	< 0.003	< 0.005
Thallium	< 0.001	< 0.010
Thorium	< 0.001	< 0.005
Uranium	0.054	< 0.060
Nickel	0.22	< 0.40
Silver	0.04	< 0.12
Tin	0.27	< 0.30
Titanium	0.28	< 1.0
Total Toxic Representation		

PERCENTILE: 68th, 95th

ESSENTIAL AND OTHER ELEMENTS

ELEMENTS	RESULT µg/g	REFERENCE RANGE
Calcium	840	200- 750
Magnesium	49	25- 75
Sodium	31	12- 90
Potassium	15	9- 40
Copper	11	10- 28
Zinc	160	130- 200
Manganese	0.05	0.15- 0.65
Chromium	0.33	0.20- 0.40
Vanadium	0.042	0.018- 0.065
Molybdenum	0.029	0.025- 0.064
Boron	0.60	0.40- 3.0
Iodine	0.23	0.25- 1.3
Lithium	0.004	0.007- 0.023
Phosphorus	161	160- 250
Selenium	0.97	0.95- 1.7
Strontium	1.5	0.30- 3.5
Sulfur	43600	44500- 52000
Barium	0.49	0.16- 1.6
Cobalt	0.006	0.013- 0.035
Iron	4.5	5.4- 13
Germanium	0.032	0.045- 0.065
Rubidium	0.014	0.011- 0.12
Zirconium	0.076	0.020- 0.44

PERCENTILE: 2.5th, 16th, 50th, 84th, 97.5th

SPECIMEN DATA

COMMENTS:
Date Collected: 9/17/2004
Date Received: 10/19/2004
Date Completed: 10/22/2004
Methodology: ICP-MS

Sample Size: 0.197 g
Sample Type: Head
Hair Color:
Treatment:
Shampoo: Emerald Forest

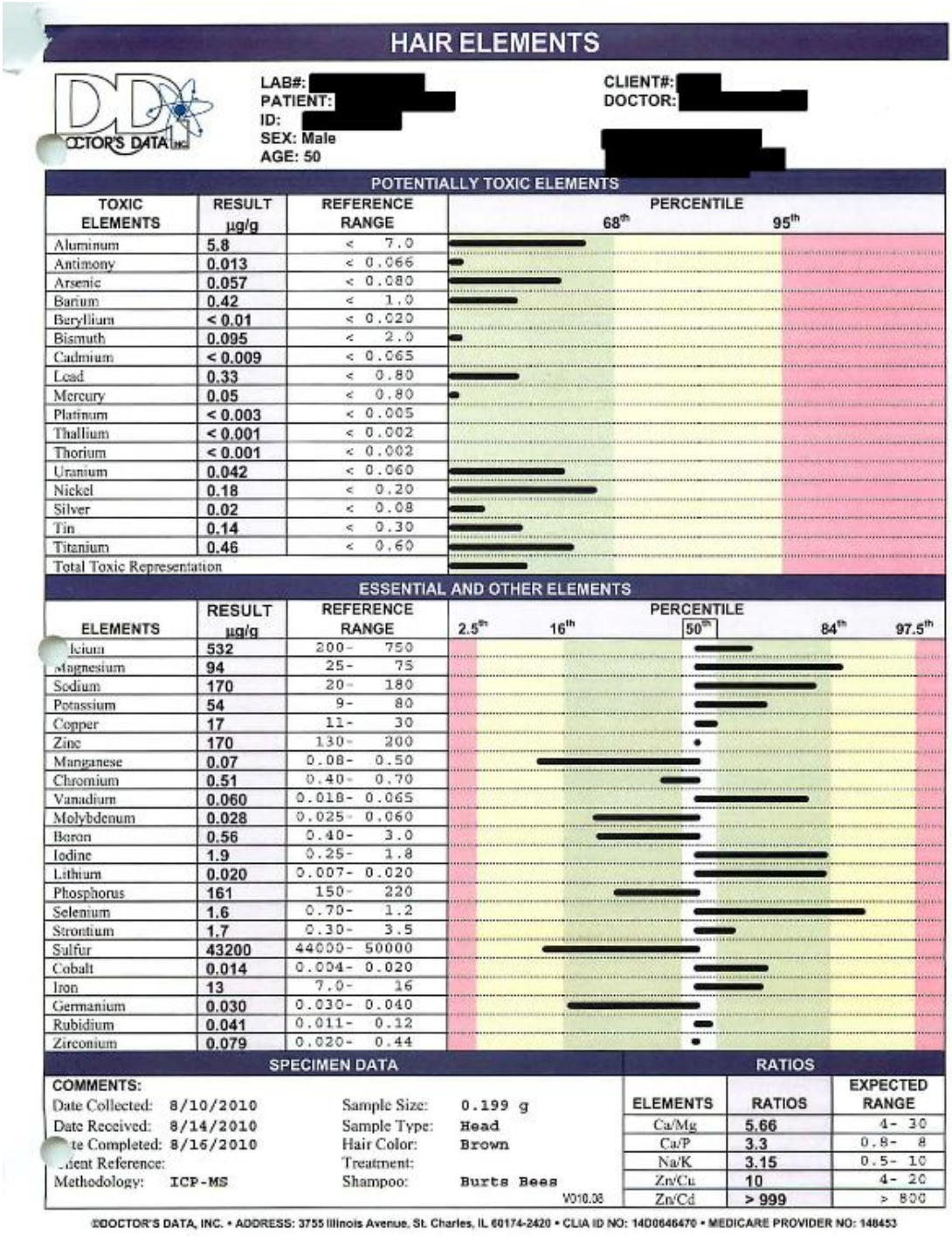
V05.99

RATIOS

ELEMENTS	RATIOS	EXPECTED RANGE
Ca/Mg	17.1	4- 30
Ca/P	5.22	0.8- 8
Na/K	2.07	0.5- 10
Zn/Cu	14.5	4- 20
Zn/Cd	> 999	> 800

Table 2

The patient's DDI Hair Elements results, after approximately two years of chelation therapy and six years after those seen in Table 1. Now, the "essential and other" elements results do not meet any of Cutler's "counting rules" criteria, and the Ca+, Mg+, Na+, and K+ are all in the same direction and Lithium levels are balanced. The results are interpreted as "negative" for deranged mineral transport and mercury toxicity. As a result, the test is now considered "normal", coincident with the patient's clinical improvement.



HAIR ELEMENTS

DOCTOR'S DATA INC

LAB#: [redacted]
PATIENT: [redacted]
ID: [redacted]
SEX: Male
AGE: 50

CLIENT#: [redacted]
DOCTOR: [redacted]

POTENTIALLY TOXIC ELEMENTS

TOXIC ELEMENTS	RESULT µg/g	REFERENCE RANGE
Aluminum	5.8	< 7.0
Antimony	0.013	< 0.066
Arsenic	0.057	< 0.080
Barium	0.42	< 1.0
Beryllium	< 0.01	< 0.020
Bismuth	0.095	< 2.0
Cadmium	< 0.009	< 0.065
Lead	0.33	< 0.80
Mercury	0.05	< 0.80
Platinum	< 0.003	< 0.005
Thallium	< 0.001	< 0.002
Thorium	< 0.001	< 0.002
Uranium	0.042	< 0.060
Nickel	0.18	< 0.20
Silver	0.02	< 0.08
Tin	0.14	< 0.30
Titanium	0.46	< 0.60
Total Toxic Representation		

PERCENTILE: 68th, 95th

ESSENTIAL AND OTHER ELEMENTS

ELEMENTS	RESULT µg/g	REFERENCE RANGE
Calcium	532	200 - 750
Magnesium	94	25 - 75
Sodium	170	20 - 180
Potassium	54	9 - 80
Copper	17	11 - 30
Zinc	170	130 - 200
Manganese	0.07	0.08 - 0.50
Chromium	0.51	0.40 - 0.70
Vanadium	0.060	0.018 - 0.065
Molybdenum	0.028	0.025 - 0.060
Boron	0.56	0.40 - 3.0
Iodine	1.9	0.25 - 1.8
Lithium	0.020	0.007 - 0.020
Phosphorus	161	150 - 220
Selenium	1.6	0.70 - 1.2
Strontium	1.7	0.30 - 3.5
Sulfur	43200	44000 - 50000
Cobalt	0.014	0.004 - 0.020
Iron	13	7.0 - 16
Germanium	0.030	0.030 - 0.040
Rubidium	0.041	0.011 - 0.12
Zirconium	0.079	0.020 - 0.44

PERCENTILE: 2.5th, 16th, 50th, 84th, 97.5th

SPECIMEN DATA

COMMENTS:

Date Collected: 8/10/2010
Date Received: 8/14/2010
Date Completed: 8/16/2010
Client Reference:
Methodology: ICP-MS

Sample Size: 0.199 g
Sample Type: Head
Hair Color: Brown
Treatment:
Shampoo: Burts Bees

W010.08

RATIOS

ELEMENTS	RATIOS	EXPECTED RANGE
Ca/Mg	5.66	4 - 30
Ca/P	3.3	0.8 - 8
Na/K	3.15	0.5 - 10
Zn/Cu	10	4 - 20
Zn/Cd	> 999	> 800

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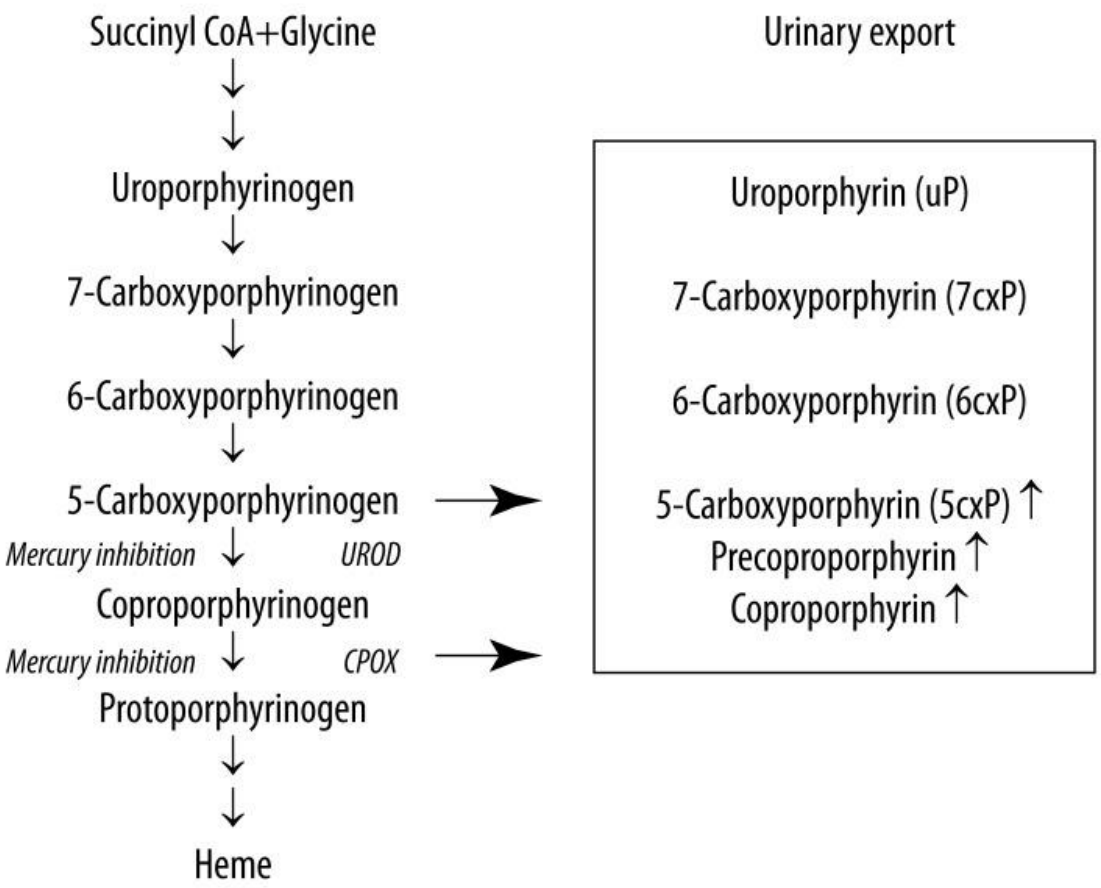
Figure 1



Porphyrinogens appear in urine as porphyrin derivates (right). Elevated mercury body-burden can results in increased urinary 5-carboxyporphyrin, porphyrin, precoproporphyrin, and coproporphyrin by inhibiting uroporphyrinogen decarboxylase (UROD) and/or coproporphyrinogen oxidase (CPOX), urinary uroporphyrin is not reported to alter with inhibition of these enzymatic steps.

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