

Taken from....Heavy Metal Overload and Toxicity, the Principles and Practice of Integrative Medicine Volume 7, **Majid Ali, M.D.**

XXVI. INTEGRATIVE MANAGEMENT OF MERCURY REMOVAL: A General Perspective

Mercury chelation with DMSA or DMPS is safe; the clinician's challenge is how to make the patient safe for such chelation.

The above is the simple conclusion my colleagues and I draw on the basis of administering mercury chelation to a large number of patients. What do I mean by making the patient safe for removal of mercury? *One must restore redox regulation and oxygen homeostasis by focusing on the issues of the bowel, blood, and liver ecosystems before vigorous attempts are made to chelate mercury with potent mercury-chelating drugs.*

I refer the reader to *Pathobiology by Microecologic Cellular and Macroecologic Tissue-Organ Ecosystems*,¹⁰⁴ the third volume of this textbook, for detailed information on how to assess the integrity of those ecosystems and undertake an integrative management for restoration. Of course, most chronically ill patients also require *support* to optimize thyroid, adrenal, and pancreatic functions. Beyond that, neurotransmitter physiology is often in jeopardy in such patients and requires attention. In Figure 1, I include a simple schema that gives my clinical priorities for achieving redox regulation and oxygen homeostasis.

Mercury Absorption From an Inflamed Bowel

I briefly cite a case study to underscore the importance of restoring the bowel, blood, and liver ecosystems in the management of mercury buildup in the body. All four members of a family consulted me for a variety of symptom-complexes. The mother suffered from asthma, ulcerative colitis, and chronic fatigue. The father suffered from depression. The daughter complained of severe premenstrual syndrome and also suffered from mild depression. The son was in excellent health and I could not elicit a clear history of any symptoms. He underwent mercury testing only because of the very high post-DMPS 24-hour urinary mercury levels of both parents (mother, 110 ugHg/g creatinine; father, 78 ugHg/g creatinine). The

corresponding values for the daughter and son were 29 and 31 respectively. A detailed family history revealed that the family actively gardened in their backyard situated in an area where large quantities of industrial mercury had been dumped nearly fifty years earlier. After a period of DMPS chelation extending over nearly two years, all four members of the family showed post-DMPS urinary mercury levels of less than 7 ugHg/g creatinine on at least two occasions. With integrative protocols sharply focused on the relevant issues of the bowel, blood, and liver ecosystems, the mother's colitis had subsided except for an occasional loose stool and she had not suffered from asthmatic attacks in months. The father's depression had abated and so had the PMS and depression of the daughter. After another three years, the mom returned with a history of relapse of ulcerative colitis of several months' duration. As a part of her work-up, her post-DMPS urine mercury was found to be elevated again at 29 ugHg/g creatinine. Curious at what might have happened to others in the family, each decided to have mercury level testing repeated. All results were very close to their respective values two years earlier.

I propose the following possible mechanism for mercury buildup in the mother's case: In subjects without chronic inflammatory bowel lesions, mercury from various sources—dental amalgams, fish and other foods, and environmental pollutants—is taken up avidly by the bowel flora and the bulk of it is excreted with feces. By contrast, in the presence of chronic inflammatory bowel lesions—ulcerative colitis, Crohn's colitis, ischemic colitis, and others—the bowel flora changes with overgrowth of anaerobes. In nearly all peripheral smears of patients with active colitis of various types I have examined, I observed diffuse growth of primordial life forms in the blood. Under those conditions—it seems to me—the dominant flora in the bowel picks up mercury in the bowel and actively transfers it to the tissues by invading the blood. Earlier, I included the abstract of an article entitled "Oxidative Regression to Primordial Cellular Ecology" published in *The Journal of Integrative Medicine*¹⁵⁹ to provide a framework for overgrowth of primordial life forms in the bowel, and then in the circulating blood and other tissues. Interested readers will find a large number of photomicrographs to illustrate the phenomenon in that article.

The Sulfur Foods

A widely contested issue is the use of sulfur-

containing foods and certain substances that contain sulfhydryl groups and serve crucial redox restorative functions—designated as redox-restorative substances (RRSs)—in the various volumes of this textbook. Those foods and RRSs are listed in Table 16-21. Some writers strongly recommend the use of the sulfur foods and RRSs as antidotes for mercury during periods of amalgam removal and mercury chelation. Interestingly, other writers deem eating of those foods and the administration of those RRSs as dangerous during those periods. A careful review of the literature reveals that those who vehemently oppose the use of sulfur foods and RRSs during mercury chelation do not have true-to-life clinical data to support their contention. Rather, they base their opinion on their *notions* of the danger of 'mercury redistribution' carried by such foods and substances. This group largely comprises chemists, engineers, and others without clinical practices. Those who recommend the use of sulfur foods and RRSs are largely clinicians and base their recommendation on their empirical experience. My colleagues at the Institute and I agree with the latter group.

There is, however, some merit to the argument that the use of sulfur foods and sulfhydryl RRSs concurrently with the administration of DMSA and DMPS during initial laboratory testing may lead to underestimation of the total body burden of mercury. Under those conditions, disulfide formation will occur to a larger degree with concomitant decrease in mercury binding and consequent reduced urinary excretion of mercury.

The amino acid glycine in oral doses of 40 to 80 mg/kg of body weight may be administered to enhance urinary mercury excretion during the mercury chelation process. The mechanism of action of such supplementation of glycine is not clear, since it does not involve disulfide bond formation.

The case for diligent assessment of the functional integrity of the bowel, blood, and liver ecosystems *before* undertaking removal of mercury cannot be overstated. In Figure 1, I presented a schema of the trio of trios of human ecosystems to underscore the importance of disruptions of the bowel, blood, and liver ecosystems that *always* exist in clinically significant mercury toxicity. Here, I reiterate three essential points:

1. Safe and effective mercury removal cannot be undertaken without restoring those

ecosystems;

2. Most of the so-called mercury detox reactions can be neither understood nor prevented without a clear view of the states of those ecosystems; and
3. Mercury removal commonly does not yield long-lasting good results without ongoing focus on the health of those ecosystems.

At the Institute, my colleagues and I never implement our mercury chelation protocols within six weeks of the initial evaluation of the patient. The primary reason for our caution is cases in which we observed how early and aggressive efforts to chelate mercury without prior restoration of bowel ecology led to serious adverse effects. Some such examples were presented earlier in the section entitled "A Study in Reverse."

The DOs and AVOIDs for Mercury Chelation

In this section, I furnish some general guidelines for choices in the kitchen during mercury chelation. These guidelines for "Dos" and "Avoids" in use at the Institute are not merely based on our experience with patients with mercury-related ill health. Rather, it is based on the clinical outcome obtained with over 7,000 patients with chronic, indolent autoimmune, ecologic, nutritional, infectious, and degenerative disorders characterized by unremitting oxidosis and dysoxygenosis. Without exception, individuals with mercury-related oxidative-dysoxygenative (MROD) dysfunction show evidence of disrupted bowel ecology, oxidative coagulopathy, and functional deficits of cytochrome P450 and other mixed function oxidases. Indeed, serious clinicians in most instances cannot clearly delineate symptom-complexes that may be directly attributed to mercury and those caused by molecular events that both precede and follow mercury-related oxidosis and dysoxygenosis.

The Beef Against Beef

Another interesting aspect of nearly all published 'mercury detox' protocols by biological dentists and integrative physicians is that the authors are nearly always have a beef against beef. They are prejudiced against it in that they all are in agreement with mainstream cardiologists and internists. Of course, cardiologists and internists hold that beef raises the blood cholesterol levels and so causes coronary artery disease. They are caught up in the frivolous notions of

preventing coronary artery disease (CAD) by using cholesterol-lowering drugs. They are not interested in the basic science of chemistry. Cholesterol—an antioxidant—cannot be blamed for CAD any more than pure water can be blamed for dysentery. Rancid cholesterol injures coronary arteries just as pollutants in water can cause disease. But what is the beef against beef of integrative physicians? I have not been able to uncover the elusive rationale behind such "beef-phobia." One dentist—I am in awe of his enormous contribution to the true science of mercury—includes beef in his don'ts list. He favors poultry in his 'protocol' for mercury chelation. Interestingly, on the same page of his protocol he recognizes that large amounts of fishmeal—with a high mercury content—are fed to the chickens. If one were to follow all the don't lists from the various published protocols for 'mercury detox,' it becomes evident that the patient cannot eat fish, beef, poultry, dairy, eggs, grains, and fruits. One could eat venison every day of the week, but then deer and elk in our country are beginning to die of prion disease—related to the dreaded mad cow disease of Europe.

I might add here that the Swiss—with the second-longest life span among the peoples of the world—are not known for their hatred of beef or dairy.

Mercury chelation often lasts for several months, not uncommonly for up to two years. Some sanity has to prevail. If one loves steak, there is no reason why he cannot have that once or twice a week. If a cup of coffee is one's sin in the morning, there is nothing immoral about that during mercury chelation.

My list of "DOs" and "AVOIDs" should be seen in light of the above comments. The reader is referred to chapter 8 of *The Butterfly and Life Span Nutrition*¹⁹⁴ for detailed information about the nutritional materials presented below. Years of working with seriously sick persons has taught me one thing: An ill person must accept life as her/his journey, not anyone else's. That is true of everyone, but the chronically ill have a biologic imperative to recognize that truth and live by it, day after day after day. I address the problem at length in *What Do Lions Know About Stress?*¹⁹⁵

DOs	AVOIDs
Meditation	Anger
Prayer	Blaming others
Exercise	Seeing yourself as a victim
Overhydration in the morning	Sugar and sugar products
Organic vegetables (see Table 18 for listing)	Caffeine products (coffee, cola, chocolate, and tea)
Not-too-sweet fruits (berries, pears, green apples)	Refined grains
Cold-pressed oils (see Table 20 for listing)	Processed fats (freedom fries and others)
Whole grains (soaked overnight, with a tablespoon of plain yogurt if digestive problems exist)	Very sweet fruit (grapes, bananas, mangoes)
Sauna	Alcohol abuse
	Tilefish, swordfish, king mackerel, shark, and tuna have a high content of mercury and <u>should not</u> be eaten
	Smoking

First Choice	Second Choice	Third Choice
Carbon-filtered water	Bottled spring water	Skim milk, cow
Fresh vegetable juice	Bottled deep-well water	Low-fat cow's milk
Ginger water	Mineral water	Lite diet soda (7up et al.)
Bancha tea	Fruit juice	Grape juice
Grain coffee	Grapefruit juice	Cranberry juice
Herbal teas	Soy milk, diluted	Orange juice
Spring water	Rice milk, diluted	Coconut juice
Deep-well water	Sheep's milk	Nut milks, diluted
	Goat's milk	Salted vegetable juice
	Buffalo's milk	
	Green tea	

Table 18. Choice One and Choice Two Vegetables¹⁹⁷	
Choice One	Choice Two
Daikon	Romaine lettuce
Burdock	Boston lettuce
Red radish	Spinach
Squashes	Onion
Chinese cabbage	Carrot
Turnips	Tomato
Green beans	Red peppers
Shiitake	Green peppers
mushrooms	Yam
Lotus root	Eggplant
Turnips	Iceberg lettuce (less desirable)
Green Beans	
Green leafy vegetables	
Ginger	

Table 20. Choice in Fats and Oils¹⁹⁹		
First Choice	Second Choice	Third Choice
Olive oil	Safflower oil	Corn oil
Ghee	Sunflower oil	Cottonseed oil
Butter	Soybean oil	
Sesame oil	Avocado oil	
Flaxseed oil	Canola oil	
Table 21. Guidelines for Supplementation of Essential Oils		
Flaxseed oil	One to two tablespoons in weekly or 4-day rotation.	
Olive oil		
Sesame oil		
Evening primrose oil		
Borage oil		
Fish oils		

Table 19. Choice in Proteins¹⁹⁸		
First Choice	Second Choice	Third Choice
Protein & peptide powders	Chicken	Beef
Hunted fish	Turkey	Veal
Lentils	Shellfish	Pork
Beans	Cornish hen	Cultured fish
Duck	Egg	
Quail		
Wild game		
Goat		
Sheep		
Lamb		
Guinea hen		
Muscovy duck		
Whole grains		
Spirolina		
plankton		

All supplementation with therapeutic oils must be done with cold-pressed oils taken at cold temperatures. Cooking depletes such oils of all their clinical benefits. My personal preference for flaxseed is to soak one or two tablespoons of the seeds in two ounces of water for 45 minutes and then chew the softened seeds or take them with water. Flaxseeds become very soft and are easily chewed after softening with water.

The issue of Omega 3 (n-3) polyunsaturated fatty acids derived from marine sources is important. As sources of fats and oils, the marine food webs differ fundamentally from the currently available fats and oils from terrestrial agricultural food products.²⁰⁰ The common terrestrial sources—fats derived from ruminant animals and various seed oils—are rich in saturated and monosaturated fatty acid. Animal fats nearly always are rich in the saturated types (chiefly 16:0 and 18:0), whereas vegetable seed oils have a high content of mono- and polyunsaturated fatty acids (primarily 18:0 [n-9] and 18:2 [n-6]). Flaxseed oil is an important exception, since it has a substantial content of 18:3 (n-3).

By contrast, the primary producers of marine fatty acids are unicellular phytoplanktonic algae, which predominantly belong to longer-chain n-3 types of fatty acids—20:5 and 22:6 acids as well as C16 and C18 n-3 polyunsaturated fatty acids (PUFA). These PUFA are efficiently harvested by filter feeding zooplanktonic crustaceans which, in turn, are consumed by

zooplanktonivorous teleost fish. In efficient marine food webs, there is little, if any, biohydrogenation. Thus, the marine oils are rich in n-3 PUFA, especially 20:5 (n-3) and 22:6 (n-3). The marine n-3 PUFA have health benefits substantially in excess of those of n-6 fatty acids from the common terrestrial sources. I discuss this subject further in the chapter entitled "Complementarity and Contrariety in Lipidomics" in *Nature's Preoccupation with Complementarity and Contrariety*.

Sulfur Foods	RRSs
Asparagus	Dairy products
Bok choy	Eggs
Broccoli	Garlic
Broccoli flower	Kale
Brussels sprouts	Leeks
Cauliflower	Onions
Cabbage	Rutabagas
Chlorella	Shallots
Chlorophyll	Turnips
Cilantro	Whey products
Coffee	

Bowel Support	Liver Support
Bowel-supportive herbs	Proteolytic enzymes
Digestive enzymes	Lecithin
Aloe	Milk thistle
Echinacea	Dandelion
Astragalus	Black radish
Burdock root	Catnip
Goldenseal	Jerusalem artichoke
Peu D'Arco	Fennel seeds
Artemesia	Ginger
Red Cloves	Garlic
Walnut	
Fenugreek	
Ginger	
Garlic	

Six Cs and Five Gs for Mercury Chelation

In mercury chelation programs, eleven substances—the names of six beginning with the letter C and the remaining five with the letter G—deserve a special note. Table 24 shows the listing of both categories with some guidelines for doses. Some explanatory notes follow the table.

Six Cs		Five Gs	
Item	Dose	Item	Dose
Citrate	1-5 gm	Garlic	cooked
Chlorella	3-4 gm	Ginger	raw or cooked
Chlorophyll	1-3 gm	Ginko	1-3 capsules
Cilantro	1-2 gm		
Curcumin	1-3 gm	biloba	
Clay (bentonite)	2-4 gm	Gotu kola	1-3 capsules
		Ginseng	1-3 capsules

*On a five-days-a-week basis for the duration of the treatment, to be determined by the attending physician.

The six Cs are of empirical value in a mercury chelation program. Interestingly, there is a general consensus about the clinical efficacy of four of the six—citrate, chlorella, chlorophyll, and clay—while some disagreement exists about the value of cilantro and glutathione. However, those who oppose the use of glutathione and cilantro generally do not cite any data nor do they describe their empirical experience. Rather, they *think* cilantro should not be used because they do not *like* it.

Citrate is a negative ion and has been widely recommended to provide a balance for large amounts of magnesium and calcium often administered to patients receiving mercury chelation therapy. Citrate improves renal clearance of several plasma constituents—including aluminum and iron—and, indeed, may facilitate removal of mercury by other chelating agents. It is best administered as a part of mineral formulations. Alka- Seltzer Gold (containing citrate) has been recognized to be of considerable clinical value in the management of acute and subacute adverse food and environmentally induced reactions by clinical ecologists for decades. In that role, citrate is

also of value in managing adverse reactions during chelation of heavy metals, including mercury. A dose of one to five grams may be employed when patients are administered substantive doses of magnesium and calcium.

Chlorella (Chlorella pyrenoidosa) is one of the favorites of the 'mercury detox' community. It has a very high content of chlorophyll—at about 29 g/kg, it surpasses all other known plant sources of the protein. Chlorophylls and related proteins form complexes with many natural and synthetic compounds and prevent their reactions with certain enzyme and nucleotide sequences. The effects of chlorella on hepatic enzymes are varied and paradoxical in some context. For example, it inhibits the Phase I cytochrome P450—an important enzyme involved in metabolic processing and elimination of xenobiotics. In *in vitro* experiments, chlorophyllin, the sodium/copper derivative of chlorophyll, inhibited nearly all hepatic enzymes examined. The putative anti-carcinogenic effects of chlorella are generally attributed to those effects. On the other hand, chlorella appears to induce hepatic enzymes involved with metabolising alcohol, as suggested by its ability to prevent hangover after consumption of alcohol.²⁰¹ The cell walls of chlorella bind to mercury, lead, cadmium and other toxic metals and facilitate their removal.²⁰² It also promotes processing and elimination of some environmental pollutants. In addition, it has recognized antiviral, antibacterial, and antitumor properties.^{181,182} Dose guidance: Initially, a daily dose of four grams of chlorella (to be taken in two doses 30 minutes before or 60 minutes after food) may be administered. After one week, dose may be doubled after initial tolerance is assured.

Chlorophyll and cilantro are recommended by most writers, largely for empirical reasons. I have not been able to find good documentation of their putative chelating efficiencies for mercury established by laboratory studies. (Though I recognize that no one has full access to *all* the literature on any subject today.) However, both have been extensively used for centuries for other clinical indications.

My interest in turmeric, the source of curcumin, was sparked many years ago when my wife told me that curries cooked with turmeric keep much better than those prepared without it. Then I recalled taking 1/3 to 1/2 teaspoon of powdered turmeric with a cup of milk three to four times a day was a preferred

therapy for common viral infections of the upper respiratory tract in Pakistan. Today I do not recommend milk to take turmeric with— organic vegetable juice works better.

Table 25. Guidelines for Vitamin and Mineral Supplementation During Mercury Chelation

Vitamin A	10,000 to 20,000 IU
Vitamin B complex	10 to 30 mg
Vitamin B ₁₂	1,000 to 5,000 mcg weekly
Vitamin C	1,000 to 3,000 mg
Vitamin D	100 to 250 IU
Vitamin E	200 to 400 IU
Calcium	1,000 to 1,500 mg
Magnesium	1,000 to 1,500 mg
Potassium	200 to 400 mg
Selenium	100 to 500 mcg
Chromium	100 to 500 mcg
Molybdenum*	100 to 200 mcg
Miscellaneous	Organic vegetable juice

* Molybdenum is a mineral cofactor of three important enzymes in the redox system: sulfite oxidase, aldehyde oxidase, and xanthine oxidase.

Ultra-Fine Particle Preparations

Attempts have been made to enhance the clinical efficacy of natural products, such as chlorella and cilantro, by developing products with ultra-fine particles, the so-called "nanonization."²⁰³ The expectation is that nanonization vastly improves not only absorption of ultra-fine particles, but markedly increases the surface area available to bind mercury and other minerals. It is also claimed that probiotics with broken cell membranes included in such a product increase the chelating ability of such products. To date, however, the limited information about the therapeutic efficacy of the products comes only from the manufacturers. Such products might represent significant advances if the clinical efficacy can be confirmed by independent clinicians. Claims have also been made that fulvic acid included in some probiotic preparations adds to the chelating efficiency of the formulation.²⁰⁴ Again, validation of such claims from independent clinicians is needed.

Table 26. Guidelines for Supplementation With Redox-Restorative Substances (RRSs) During Mercury Chelation

Lipoic acid	100-400 mg
Methylsulfonylmethane (MSM)	500-1,500 mg
Glutathione (Parenteral)	400-800 mg
Taurine	500,1,500 mg
N-acetylcysteine	100-300 mg
Co-Q10	100-300 mg
Phosphatidylserine	75-150 mg

Sauna

Mercury is excreted with sweat, albeit at a very low level. That creates an opportunity to harness a natural and relaxing method to facilitate mercury removal. Below, I include steps of creating a sauna I recommend to my patients.²⁰⁵

Creating a Sauna in the Bathroom

- * For the desired temperature in the bathroom with closed door, use an ordinary heater to heat the bathroom.
- * Start with the air temperature of 100 degrees Fahrenheit.
- * Build to 108 degrees F.
- * Use a pool thermometer for taking temperature
- * Call in an electrician if you need an extra line for a second heater
- * Desired time period of sauna; start with ten minutes, then build to 30 minutes, with increments of five minutes
- * Seating: Folding all wood chair
- * Fold a towel to make a seat
- * Liver pack
- * Fluid intake: Two quarts, organic vegetable juice permissible
- * Shower (optional if sweat does not develop)

Hydrogen Peroxide Soaks

Hydrogen peroxide soaks can also be prescribed to improve general perfusion of tissues and as mild but comfortable therapy for restoring redox regulation and oxygen homeostasis in all chelation programs. The scientific basis and molecular rationale for this therapy is discussed at length in *Nature's Preoccupation with Complementarity and Contrariety*,

the first volume of this textbook, and *Oxygen and Aging*.²⁰⁶

Hydrogen peroxide soaks are very helpful in most cases of chronic low-grade inflammation, tissue swelling, and poorly healing injured ligaments and joint tissues. Recent research has shown how minute amounts of hydrogen peroxide can activate several genes that are responsible for clearing tissue debris and improve venous and lymphatic circulation. At the Institute, we have observed many empirical benefits of hydrogen peroxide for other clinical conditions. The mechanisms of action of hydrogen peroxide in those situations involve reduction of oxidative stress and restoration of oxygen metabolism. Hydrogen peroxide soaks can be used with different concentrations. The following is the Institute's standard protocol²⁰⁷:

H₂O₂ Soaks Protocol

Water	10 parts
Hydrogen peroxide 3%	1 part
Salt	One teaspoon (sea salt preferred)

Any suitable vessel can be used for doing the soaks in the living room. If possible, an electric foot massager (such as made by Brookstone Company) should be used for additional benefits. In addition to the standard 1:10 ratio of H₂O₂ and water, my colleagues and I frequently use stronger concentrations of H₂O₂, such as 1:7, 1:5, and 1:4.

Reduction of Chewing

One eminent dentist, well-known for his pioneering mercury research, strongly advises his patient to markedly reduce chewing of food on the ground that chewing increases the release of mercury from dental amalgam. That is another interesting paradox. Long before I began my study of medicine 45 years ago, I was advised by my parents to chew food well. I suppose people have known since the dawn of human consciousness that effective chewing is essential for proper digestion and absorption. It not only breaks food up for proper mixing with digestive juices in the stomach, it also gives time to salivary digestive factors to exert their beneficial effects. Generally, I have experienced little difficulty in maintaining my weight, and I attribute that to my habit of eating very slowly and chewing my food more.

So, what may one make of the advice against sufficient and effective chewing to reduce the release of mercury from dental amalgams? *Take amalgams out and keep chewing!*